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EDITED BY

**PAUL DALZIEL
AERU, LINCOLN UNIVERSITY
LINCOLN, NEW ZEALAND**

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**Agribusiness and Economics Research Unit
P.O. Box 85084
Lincoln 7647
NEW ZEALAND**

Email: paul.dalziel@lincoln.ac.nz

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Preface

The 42nd Annual Conference of the Australian and New Zealand Regional Science Association International (ANZRS AI) was held at the Australian National University, Canberra from 5 to 7 December, 2018, co-hosted with NATSEM at the Institute of Governance and Policy Analysis, University of Canberra, and the Arndt-Corden Department of Economics, Australian National University. A broad range of papers from academics, policy advisors and practitioners was presented to the conference. This publication contains the refereed proceedings of those contributed papers.

Participants who submitted their full paper by the due date were eligible to be considered for these refereed proceedings. There were ten papers submitted to a double blind refereeing process, all of which were accepted for presentation in this publication. As in previous conferences, I am very grateful to referees for their work within a short timeframe.

Three awards were presented at the conference dinner. The John Dickinson Memorial Award for best article in the *Australasian Journal of Regional Science* 2018 was awarded to Joe Branigan and Fariba Ramezani for their article “Assessing the Value of Public Infrastructure at a Regional Level: Cost Benefit Analysis Supplemented by Economic Impact Analysis” published in volume 23(2), pp. 147-167.

The ANZRS AI Award for Best Conference Paper 2018 was awarded to Abbas Ziafati Bafarasat and Lee Pugalis for their paper “The Governance of Metropolitan Regions: Governmental Business Interactions”. This paper is the first paper presented in these proceedings.

The ANZRS AI Award for Best Conference Paper by a Current or Recent Student 2018 was awarded to Mst Sabrina Haque for her paper co-authored with Delwar Akbar and Susan Kinnear “Assessing the impacts of extreme weather events on selected fruit production in Central Queensland, Australia: A relational analysis using flood data”. The committee highly commended two other entrants for this Award: Fuseini Inusah, Parves Sultan, Delwar Akbar and John Rolfe for their paper “Can Social License Theory Explain the Relationship between Corporate Social Responsibility (CSR) and Community Engagement (CE)? The New Ghanaian Petrochemical Industry Context”; and Alan Labaš and Jerry Courvisanos for their paper “Government Business Programs and Regional Business Knowledge Transmission by Professional Business Advisors”.

I thank all the participants for their involvement in our 42nd Annual Conference, particularly those who had travelled some distance from overseas to attend. The international community of regional science scholars is strengthened when people gather to share their research and expertise at conferences such as this.

Professor Paul Dalziel

Editor, 42nd Annual ANZRS AI Conference Proceedings

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The Governance of Metropolitan Regions: Governmental-Business Interactions

Abbas Ziafati Bafarasat and Lee Pugalis

Yazd University, Iran and

University of Technology Sydney, Australia

Lee.Pugalis@uts.edu.au

ABSTRACT

In pursuit of effective governance of metropolitan regions, this paper develops a hypothetical model to explain the pattern of interactions between governmental and business actors. We deploy the ‘exemplar’ method of case study selection to test the hypothesis in the Ruhr metropolitan region of Germany. The key research methods are content analysis of policy documents, in-depth interviews and a focus group with key actors. The research results draw attention to i) the role performed by business actors who are instrumental in persuading local governments to collaborate at the metropolitan scale and ii) how the state tier of government manages the process of voluntary collaboration by local governments. We find that process management is carried out through codes of outcome that limit exit and downscaling in collaboration. This combination of tactics, which we term ‘persuasion’ and ‘obligation’, is observed to result in more effective inter-local collaboration.

1. INTRODUCTION

The pursuit of effective governance of metropolitan regions is of interest to scholars and practitioners around the world. In the case of Germany and, specifically the Ruhr region, metropolitan governance is undertaken on a voluntary basis involving representatives from local government. Business actors are excluded from the formal metropolitan decision-making arena, although this does not necessarily imply that they are disinterested or marginal participants in metropolitan governance processes and issues, and also meta-governance. The aim of the paper is to investigate the organization of the conditions of governance. More specifically, it examines the meta-governance capacities and roles of business actors (persuaders) and the state (process managers). We develop a hypothesis that the main role of business organizations, as the other champion of metropolitan regimes, is to encourage local governments to step in the free-to-enter state frames in which obligations for agreement are exerted. This voluntary entrance to agreement obligations will bring about effective governance.

The methodology of this study is based on the three phases of theorization in hybrid inquiries of deduction and induction whereby: a) a broad hypothesis is developed through critical engagement with the literature informed by connection with empirical reality; b) an in-depth case study of the hypothesis is carried out. If the hypothesis passes the test, it is elaborated with empirical findings, and if not, grounded theory is applied to develop a new hypothesis from the

observations; and c) a systematic examination of a larger number of cases is undertaken to progress the hypothesis to the theory level (Ziafati Bafarasat, 2018). This study undertakes the first and second phases; utilizing the Ruhr as an ‘exemplar’ case.

The Ruhr is a formal ‘planning region’ in the state of North Rhine-Westphalia, Germany. The metropolitan area is governed by the Ruhr Regional Association, which involves seventy members with voting rights delegated by the eleven independent municipalities and four counties that constitute the area. The key research methods deployed are content analysis of policy documents, in-depth interviews and a focus group with key actors. The research results draw attention to i) the role performed by business actors who are instrumental in persuading local governments to collaborate at the metropolitan scale and ii) how the state manages the process of voluntary collaboration by local governments. We find that process management is carried out through codes of outcome that limit exit and downscaling in collaboration. This combination of tactics, which we term ‘persuasion’ and ‘obligation’, is observed to result in effective inter-local collaboration.

The remainder of the paper is organised into five further sections. In section two, we provide the study with a robust theoretical framing, which is used to develop a hypothesis. Section three explains the methodological approach and describes the case study. Sections four and five discuss an empirical examination of this hypothesis. We conclude the paper in section six by drawing attention to broader implications of the research..

2. THEORETICAL FRAMING

In reaction to managerial modes of policy making, over the past few decades, collaborative governance has emerged as a method intended to facilitate the coming together of diverse stakeholders together in negotiative decision-making forums (Ansell and Gash, 2007). Against arguments that effective network governance can work with the help of such means as institutional design (Johnson *et al.*, 2011), others point out the re-production of some managerial relationships in pursuit of effective collaboration (Klijn and Edelenbos, 2007). The latter is not a recent observation; it was conceptualized in terms of voluntary ‘regimes’ or ‘coalitions’ at around the same time as the theory of collaborative governance began to resonate in the 1990s (Maltby, 1997; Huxham, 2000).

A regime is defined as the informal arrangements by which political leaders, who govern public policy, and private interests, which govern economic decision making, function together in order to be able to govern metropolitan regions (Stone, 1989; Mossberger and Stoker, 2001; Hamilton, 2004). Socio-environmental actors may not act as regime partners when they appear on such coalition boards to provide legitimacy for the outcomes. This explains why they are not usually covered in regime studies (Logan, Whaley and Crowder, 1997). Indeed, some argue that “without business support and pressure, there would be little interest in the political community for a regional orientation.” (Hamilton, 2002 p. 405). Alternatively, some contend that some local governments see the benefits of cooperating at the metropolitan scale, which is expressed through notions such as ‘cooperative/collaborative advantage’. Lackowska (2009) establishes her thesis of the failure of voluntary collaboration between local governments in the context of the lack of business influence on these actors in the Polish context. Another implication of the metropolitan application of regime theory is, therefore, recourse to meta-governance or governance of governance. Here, business organizations may act in both capacities of governance and meta-governance (Gainsborough, 2003), where the latter involves an arms-length steering role. Similarly to business, the state has a clear economic interest in metropolitan governance and may act in both governance and meta-governance capacities (Deas and Lord, 2006).

In view of accounts that the turn from government to governance is argued to be an integral part of state reorganization rather than a general trend that extends beyond the state (Jessop, 2016), it may be considered as aimed at the creation of scope for joint meta-governance by the state and business forces which share a growth agenda. Therefore, the metropolitan application of regime theory further echoes earlier calls for the advancement of its ‘theoretical’ arsenal to discover complicated patterns of interaction between the state, business and local governments and move from a hyper-pluralist regime system towards the ability to explain and predict governance variations (Orr and Stoker, 1994; Dowding *et al*, 1999; Dowding, 2001).

Ziafati Bafarasat (2018) seeks to address this theoretical deficit through the identification of the ‘*out-in*’ and ‘*in-out*’ patterns of regime formation in some monocentric metropolitan regions of England. The author categorises regime partners into *champions* or meta-governors, i.e. the state and business organizations, and *resistive* and *responsive* actors that consist of core or peripheral local governments depending on their political or economic health. Local governments are argued to be parochial and thus resistive to supra-local collaboration unless their political or economic health declines. The weak that loses out under competitive localism to the strong signs up to the regime initiative of meta-governors creating an alliance that manages to incorporate the strong (Ziafati Bafarasat, 2018). These dynamics are, however, discovered in Local Enterprise Partnerships of local governments and business leaders – state promoted institutions in which business organizations have a prominent role and are, therefore, in the position of an assertive relationship with local politicians (Pugalis *et al*, 2014; Pugalis and Townsend, 2014; Pugalis and Bentley, 2013). However, this system of business engagement in both governance and meta-governance capacities is less common in other jurisdictions. For example, the former proves controversial even in some other neoliberal frontiers like the US where strong business influence on regional collaboration is exerted through means such as grooming candidates and contributing to campaigns (Gainsborough, 2003). In Germany, the empirical focus of this paper, metropolitan governance is restricted to the constituent local governments, which has led Fürst (2005, p. 154) to note that: “in general, German business corporations are remarkably reluctant to participate in political processes to define regional development paths”. However, this may not be interpreted as their reluctance to encourage localities to participate in such processes.

It is thus useful to provide an overview of theories and tactics of meta-governance, or the organization of the conditions for governance (Kooiman and Jentoft, 2009), in order to better understand indirect roles of the state and business organizations in metropolitan governance. According to Sørensen and Torfing (2007) and Torfing *et al*. (2012), three prescriptive standpoints can be identified in relation to their stress on different ways in which to exercise meta-governance. They consist of *interdependency* theory, *governability* theory, and *integration* theory. Interdependency theorists promote *hands-on* influence by the meta-governor on the network that takes the form of *process management* or *network participation*. Governability theorists stress the value of *hands-off* influence by the meta-governor on the network in terms of *institutional design*. Integration theorists promote even more indirect ethos than those of governability theorists. Accordingly, a core element in the exercise of meta-governance - a term that is not used by the integration theorists themselves – is the strategic formation and development of the political identities and capacities of the network actors. The *meta-governance of identities* is exercised through the shaping of norms and logics of appropriateness within the self-governing networks; through the production of specific forms of knowledge; through story telling about best practices; through a forceful campaigning of specific frames of meaning; and through the construction of symbols and rituals (Sørensen and Torfing, 2007). In metropolitan governance, the meta-governance of identities might in general be termed as *persuasion* with three basic expressions consisting of: (i) *Manipulation of*

expectations from decision makers and their image, (ii) de-emphasis on procedural complications of decisions making, (iii) and magnification of decision benefits and their de-problematisation.

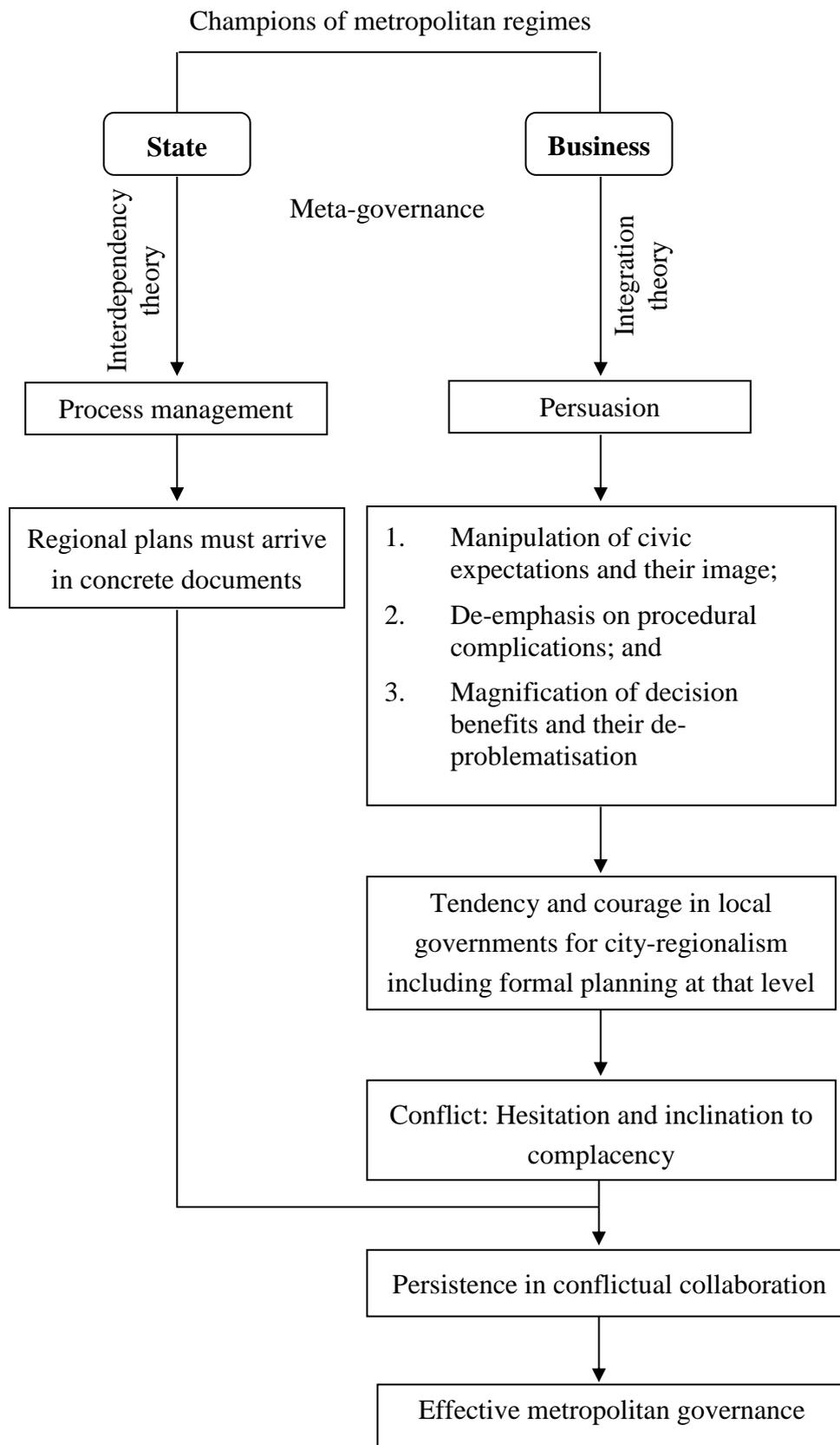
Building on Jessop's (1998) contrast between state attitudes to self-regulation, Germany is a classic example of the application of interdependency theory in terms of process management of its soft metropolitan regions (Heinlet and Zimmermann, 2011). In Germany, the *Federal Spatial Planning Act 1998* requires all the states to provide comprehensive plans which set out the overall spatial structure and hierarchy as well as major infrastructure (Kunzmann, 2001). In order to elaborate on these plans, the Act requires the states to introduce an intermediate level of planning for sections of their territory (Schmidt and Buehler, 2007). This planning activity may be devolved to metropolitan associations (Hoyler, Freytag and Mager, 2006). Although local authority groupings take up regional planning on a voluntary basis, if they do so, they must arrive at a land use plan that will provide a legal basis for investments and local plans – a mechanism that may be seen as 'constrained freedom' (Bentley and Pugalís, 2013). Under an instrumental view of productive conflict, this process management makes sure that stakeholders adjust their discourses, expectations and tactics in difficult negotiations that have to result in a concrete agreement rather than an informal memorandum that has the capacity to incorporate unresolved issues (Ziafati Bafarasat, 2016). What remains to be explored in this context is the role of the other meta-governor, namely the business sector, which has a record of regionalisation in Germany (Herrschel, 2005). The answer to this question can be sought from the lens of integration theory. Through their persuasion, business organizations can drive local government associations towards undertaking regional planning – a consequence that is then process managed by the state.

In this context, the three expressions of persuasion can be illustrated as follows:

1. *Manipulation of expectations from decision makers and their image.* It implies business efforts at metropolitan identity building and at political inducement that metropolitan identity and mobility is prevalent among the electorate;
2. *De-emphasis on procedural complications of decisions making.* It suggests business attempts to whitewash difficulties of reaching agreement between local governments as misunderstanding; and
3. *Magnification of decision benefits and their de-problematisation.* It implies business promotion of the idea that metropolitan collaboration brings about economic transformation and is ultimately a positive sum game for localities.

The hypothetic synergy of the state and business in meta-governing German metropolitan regions is displayed in Figure 1. As seen in the Figure, through persuasion, business organizations are viewed to create tendency and courage in the local political domain for city-regionalism, including formal planning at that level. In the conflictual dynamics of such serious collaboration, some local governments may seek to return to the comfort zone in terms of the previous level of collaboration, but the state requirement for the production of a formal land-use plan manages this process towards effective metropolitan governance. In brief, based on the argument that "politico-administrative institutions do not change their patterns of behaviour unless forced to do so" (Fürst, 2006, p. 925), and that the state exertion of this force for metropolitan collaboration is often controversial (Miller and Cox, 2015), this study hypothesizes that the main role of business organizations, as the other champion of metropolitan regimes, is to encourage local governments to step in the free-to-enter state frames in which obligations for agreement are exerted. This voluntary entrance to agreement obligations will bring about effective governance.

Figure 1: Roles of the State and Business in Some Soft Metropolitan-Regions, Germany



Source: The authors.

3. CASE STUDY AND METHODS

In order to examine the hypothesis, the ‘exemplar’ method of case study selection was applied with the logic that a most prepared laboratory would contribute to the precision of this first-time examination of variables and relationships while future studies could extend the empirical reach of examination to typical or even most difficult cases (Flyvbjerg, 2006; Gerring, 2007). However, in order to enable the transferability of findings in theoretical terms independent of such follow-up studies, the investigation involves ‘thick descriptions’ (Geertz, 1973) in which underlying relationships are brought to the fore of contextual particularities (Ponterotto, 2006).

Figure 2: Area of the Ruhr Regional Association



Source: Gruehn (2017, p. 217).

With the exemplar lens, the Ruhr metropolitan area was selected for this study. It is a planning region (see Figure 2 above) in the state of North Rhine-Westphalia. The metropolitan area is governed by the Ruhr Regional Association which involves seventy members with voting rights delegated by the eleven independent municipalities and four counties that constitute the area. Before 2004, it was called the Association of Local Authorities of the Ruhr Region. In 2009, The Ruhr Regional Association took on the task of formal regional planning that is basically about the provision of land-use plans at that level (Gruehn, 2017). Just one year earlier, Rommelsbacher (2008, p. 216) had observed that: “the leadership in the large cities in the Ruhr area, some of which initially demonstrated a restrained interest in the regional level, have now increasingly discovered it as an interesting realm of action.”. This shift in political attitude at the same time as the evolution of regional business organizations in the Ruhr (Keil and Wetterau, 2013) provides a ground to examine the research hypothesis. A similar coincidence took place in the early twentieth century when municipalities in the Ruhr were among the first in the country that voluntarily organised themselves to undertake regional planning (Schmidt and Buehler, 2007). Before that, the Emscher Association was founded in 1899 in the form of an issue-based partnership to organize sewage disposal and then undertake revitalization

projects throughout the Emscher canal (Gruehn, 2017). Regional business organizations in the Ruhr consist of three main bodies. First, there are six chambers of commerce each covering part of the metropolitan area. Second, *Initiativkreis Ruhr* covers the whole area and consists of 70 major enterprises, for example, in transport, tourism, IT, finance, sport, steel and energy. Third, *Pro Ruhrgebiet* is focused on the Ruhr area but extends to the wider Rhine-Ruhr region. The organization is composed of more than 300 companies.

The analytical framework of the study is based on the agency, structure, institutions, discourse (ASID) model that was designed under the DEMOLOGOS methodological project (Moulaert, Jessop and Mehmood, 2016). In this study, in ontological and epistemological terms, ASID helps explain behavioural drivers of agency within certain structure and institutions, for example, in that why local governments are naturally parochial. The model also helps explain how discourse (e.g. persuasion) can impact agency and thus relevant structure and institutions.

In order to expand and triangulate evidence, multiple sources were applied to elicit data in the case study. These consisted of policy briefings, regular press releases, minutes of meetings and draft regional plan documents complemented by in-depth interviews and a focus group with key actors from the public sector and business. Given the mainly deductive mode of the inquiry and the researchers' contextual knowledge, the data underwent single-cycle interpretive coding (see Saldana, 2016) in relation to the conceptual components of the hypothesis (see Figure 1). The codes were linked in NVivo to facilitate the examination of relationships between the conceptual components and arrive at overall conclusions with a view of quantitative content analysis (see Riffe, Lacy and Fico, 2014).

The next two sections, i.e. persuasion and local political response, discuss empirical findings on the hypothesis. Under persuasion, its three expressions are analysed in separation. Local political response will be discussed under three sub-sections. As seen in Figure 1, they consist of the following: (a) the impact of persuasion on tendency and courage in local governments for city-regionalism, (b) emergence of conflict and subsequent hesitation of localities in the continuation of this difficult path, and (c) the role of process management by the state in the prevention of localities' return to the comfort zone.

PERSUASION

4.1. Manipulation of Civic Expectations and Their Image

This study observed an explicit attempt by the business to make citizens identify with the Ruhr metropolitan area through various cultural and sport activities that are in particular aimed at the youth and influential community figures. These initiatives are administered in collaboration with the media, educational establishments, the Ruhr Regional Association and others. A core objective of *Pro Ruhrgebiet* is supra-local identity building under which programmes like *Citizens of the Ruhr* or the *City of Ruhr* are taken forward. In 2008, following the symbolic foundation of the *City of Ruhr (City of Cities)* by more than 500 citizens at Music Theatre im Revier, Chairman of *Pro Ruhrgebiet*, that was behind the initiative, noted: “*the great popularity shows that the desire for the development of the City of Ruhr is not a mere brainwashing of a few*” (Pro Ruhrgebiet, 2008a). By initiatives like this one, which was declared as a bottom-up reaction to parish pump politics, business leaders not only seek to extend community expectations beyond administrative boundaries but also induce among political elites that this transformation has by large taken place. In order to pursue the latter, some business actors in the area utilise bilateral informal discussions with local politicians and senior officers. A sport business representative, for example, talked to a local politician about people in Essen who have frequent visits to Dortmund and are sometimes unhappy about the integration of the transport system.

Business organizations have also resorted to the presentation of live evidence about metropolitan expectations to local politicians. For example, in October 2010, Pro Ruhrgebiet invited citizen representatives and the Ruhr Regional Association to a meeting to discuss relevant expectations (Pro Ruhrgebiet, 2010). Business organizations are actively engaged in the publicity of scientific evidence on the dominance of the Ruhr citizenship. For example, in a specific publication about the need for, and approach to, collaboration in the Ruhr, *Initiativkreis Ruhr* (2012) reflects a finding of Rhine-Westphalia Institute for Economic Research that more than half of people identify with the metropolitan area (RWI, 2011). For business players, seminars are a complementary means to influence the image that local politicians have from community expectations. A business representative, for example, noted: *“In 2016, there were two seminars in which discussions of cross-boundary community demands were at the table...seminars create a suitable atmosphere for the exchange of arguments between business and politics... but in order for politics to listen, seminars need to be supported by other means like evidence and preliminary discussions on various occasions”*.

4.2 De-emphasis on Procedural Complications

Without a specific reference to the term, business organizations were found to have resorted to the concept of ‘smart specialisation’ to argue that complications of reaching agreement between local governments in the Ruhr are the result of misunderstanding rather than interest conflict. Smart specialisation implies that every locality builds on its strengths and comparative advantages to select a limited number of priorities for investments (Estensoro and Larrea, 2016). With the argument that ‘everyone can do something better than the neighbor; together, they can do all’ (Figure 3), *Initiativkreis Ruhr* considers mismatch between competition and collaboration a phenomenon of the past that can be resolved without a need for the creation of new institutions and assignment of new authority (*Initiativkreis Ruhr*, 2012, p. 4). The organization held a panel discussion in 2012 (Figure 4) where a contest was announced for relevant ideas of how local governments in the Ruhr area might function in the same way as a business cluster. One interviewee, for example, suggested: *“two such examples would certainly be Dortmund and Bochum. Dortmund is strong in big data with a lot of companies working in this field. In Bochum, there is strong IT security. The two municipalities are now working together on this. Sometimes they refer investors to their colleagues at the other municipality.”* On the other hand, Pro Ruhrgebiet relates procedural complications of collaboration, for example, between the cities of Mülheim, Duisburg and Dortmund to limitation in the scope and extent of collaboration (Pro Ruhrgebiet, 2011). Just one year before the Ruhr Regional Association took up regional planning, Pro Ruhrgebiet recommended this undertaking to overcome such complications (Pro Ruhrgebiet, 2008a). So whilst both *Initiativkreis Ruhr* and Pro Ruhrgebiet reflect procedural complications as misunderstanding rather than interest conflict, the former proposes a business model to overcome such misunderstanding, but the latter suggests more courageous engagement across various issues and wider territories for a better understanding of interwoven stake, mutual learning and relationship building between various local government actors in the Ruhr and the wider North Rhine-Westphalia.

4.3 Magnification of Decision Benefits and Their De-problematisation

According to *Initiativkreis Ruhr*, metropolitan collaboration might produce a limited number of local losers in the short run. Therefore, they suggest stakeholders should not seek unviable benefit to allow for the process to work (*Initiativkreis Ruhr*, 2013). The idea is that although a locality that discontinues provision for an activity in which another locality has more potential might lose some short-term business rates, they will be reimbursed by others’ adoption of a similar approach. Additional benefit will then be achieved for all by enhancement in international competitiveness. The image that Pro Ruhrgebiet draws is more assertive. The

organization suggests enhanced metropolitan collaboration is the route to international prosperity that meets the interests of all municipalities involved (Pro Ruhrgebiet, 2008b). Discourses utilised by Pro Ruhrgebiet seem to be inspired by spill-over theories; they seek to create faith in the workability of these theories so that discussions of the relevant spatial trends turn important to localities from a transitional rather than evaluational viewpoint. In the words of one interviewee, this means that *“if everyone thinks the issue of who gets what first only matters to the extent that the cycle of prosperity kicks off for all administrative areas, plan making decisions will only have to consider the environmental implications of priorities”*.

Figure 3: A Business Model for Collaboration between Localities in the Ruhr



Source: Initiativkreis Ruhr (2012, pp. 20-21).

Figure 4: Cooperation Ruhr Panel Discussion



Source: Initiativkreis Ruhr (2012, p. 14).

Chambers of commerce, that rather than a business cluster represent a heterogeneous collection of small enterprises that are by law required to join the chamber, abstain from magnification and de-problematisation of collaboration benefits; basically, they reflect evidential cases where, for example, localities have worked together and improved freight transport navigation in the area (IHK Ruhr, 2016). Although persuasion is a relatively safe zone of regional politics for business organizations, as this example of chambers indicates, they adjust the gauge of discourses in the spectrum of evidential reflections to enticing predictions with their interests.

5. LOCAL POLITICAL RESPONSE

5.1. *Tendency and Courage in Local Governments for City-Regionalism*

In the study, senior local actors were asked how they obtain community views on, and form an opinion about implications of, metropolitan collaboration before making a decision on this track. Coupling answers to these questions with an analysis of the origin of secondary sources that these actors mentioned, it can be argued that persuasion has been behind a drive among local governments in the Ruhr towards serious collaboration. This drive turned evident following the period 2000-2003 in which business organizations intensified relevant backstage activities to enable competition under growth slowdown in the Euro zone. A local government employee, for example, said: *“In that period, politicians and departmental managers received more invitations from business institutions to take part in events about the future of the Ruhr. Municipalities received various publications and video presentations from them”*.

In 2003, several cities of the Ruhr, such as Duisburg, Essen, Bochum and Dortmund, joined together under the Städteregion 2030 (city-region Ruhr 2030) in order to heighten their collaboration with a spatial strategy (Keil and Wetterau, 2013). After the elections in 2005, the state of North Rhine-Westphalia was governed by a conservative-liberal coalition that wanted to establish a higher degree of autonomy for the Ruhr Regional Association in regional planning. Parallel to this, local authorities in the Ruhr started to prepare a joint plan (Gruehn, 2017). This informal plan that was published in 2007 with a level of land-use detail confirmed former signals to the state that localities in the Ruhr were ready to take on the task. Following these achievements, some major enterprises such as ThyssenKrupp moved to Essen and joined Initiativkreis Ruhr nearly at the same time as the devolution of regional planning to the Ruhr Regional Association in 2009 (Keil and Wetterau, 2013).

5.2 *Conflict: Hesitation and Inclination to Complacency*

The Ruhr Regional Association started preparing its regional plan in 2010 with optimism among local governments about the process and implications of their agreement on land-use allocations. However, frictions over investment sites began to surface as early as discussions of strategic selection entered the practical stage. The issue was that smart specialisation could not work as conceptualised by business organizations because there were many administrative divisions all of which wanted to specialise in a few fields of economic activity. The argument that smart specialisation should be based on current potential was challenged because in the intended fields of knowledge-intensive activity boosting potential was on the agenda of every local development plan.

In that context, in the words of a regional planner, *“there was a fear that traditional groupings of municipalities and counties in the area would surface again in regional planning”*. Some local stakeholders believed that collaboration achievements before this regional planning, in particular the informal plan of 2007, were valuable enough to justify retreatment in the light of certain conflict and increasingly uncertain benefit from the exercise. There were interviewees who regarded it as a natural characteristic of already established players like political elites to

seek u-turns in a turbulent context. In collaborative metropolitan governance, this approach even within a small minority of local politicians would lead to retreatment from strategic decisions that are taken with optimism but then face complications – complications that, however, tend to be integral to the success of such decisions. Interview accounts suggest that about one fourth of the local governments felt disillusioned in their first year of engagement in regional planning and thought a quit option or ability to downscale it to a loose document would have been in their interest. A local government interviewee, for example, noted “*you mentioned rightly that what we have here is soft governance... reversibility is an asset of soft governance, but it does not apply to the style of regional planning that we do*”.

5.3 Obligated Persistence: Effective Governance

The process management of regional planning under state regulation not only prevented a u-turn in this serious collaborative exercise in the Ruhr but also resulted in an innovative approach by localities to resolve conflicts that they found themselves entrapped by. This innovation was a process design within the process management of the state. Regional Discourse was initiated in this context in mid-2011 to position stakeholder involvement, expertise and transparency in the regional planning process towards inclusive acceptance of outputs (Tönnies, 2017). It replaced the business rhetoric of smart specialization and problem solving by action with a less visionary alternative in which the comprehensive design of collaboration would determine how helpful the outcome would become. This alternative was not enticing, but at that stage, where stakeholders were entrapped in a conflictual process, it offered a way towards an agreement.

In the regional planning that ensued, examples of effective governance formed on the platform of Regional Discourse. A most notable example was the identification of Regional Cooperation Sites for commercial and industrial uses (RVR, 2016). At the conception stage of this exercise, it was decided that the sites should be at least 8 hectares, their development should take place in regional coordination, and their distribution should consider territorial balance. The sites nominated by the municipalities and counties were subjected to scientific evaluation in coordination with the working group Regional Discourse. Then, both the methodology and resultant site prioritisation underwent the feedback of localities. Their extensive feedback supported all of the 41 sites that had been screened (RVR, 2016). An implicit system of vote trading was behind the consensus of the localities on these sites. Vote trading was facilitated by the relatively large number of the sites so that every locality had stake in the deal. This number, however, was not viable. At the next stage, a second round of scientific evaluation was carried out on the sites in terms of factors like regional green belts, flood areas, priority areas for wind power plants and settlement structure. This evaluation, which similarly to the first scientific evaluation built on Regional Discourse, reduced the number of Regional Cooperation Sites to 19 (RVR, 2016).

This example portrays effective governance in the spectrum between lowest common denominator and paralyzing conflict. The breakthrough was that stakeholders decided to resolve their differences by the definition of a framework (Regional Discourse) for decision making in which science, politics and the environment work in sequence to complement one another’s limitations. This framework facilitated making agreement in the most conflictual field of regional planning that is the identification of sites for investment. The framework did not make enticing promises and would thus be less likely to be sought by established players in local governments on a basis other than the resolution of a conflict that they were led to. If conflict resolution is seen as a main criterion for effective soft governance, what has been achieved in the exercise of Regional Cooperation Sites in the Ruhr is a noteworthy expression of that effectiveness.

6. CONCLUSIONS

This study was based on the three phases of theorization in hybrid inquiries of deduction and induction whereby: a) a broad hypothesis is developed through critical engagement with the literature informed by connection with empirical reality; b) an in-depth case study of the hypothesis is carried out. If the hypothesis passes the test, it is elaborated with empirical findings, and if not, grounded theory is applied to develop a new hypothesis from the observations; and c) a systematic examination of a larger number of cases is undertaken to progress the hypothesis to the theory level. This study of metropolitan governance regimes undertook the first and second phases with the following outcomes.

6.1. *The Hypothesis*

The paper started with the argument that the metropolitan-regional application of regime theory further calls for the advancement of its ‘theoretical’ arsenal to discover complicated patterns of interaction between the state and business (as champions of regionalism) and local governments (as parochial actors) and move beyond a so-called ‘hyper-pluralist’ regime system that our knowledge is currently limited to. In Germany, metropolitan governance boards are the preserve of constituent local governments. Coupling this with the existence of various business organizations at that level, one hypothetical track of this study was that business organizations undertake a persuasive role to engage local politics through ‘soft’ modes of metropolitan collaboration. This role was conceptualised to find three expressions, including *manipulation of expectations from local politics and their image*, *de-emphasis on procedural complications of collaboration*, and *magnification of collaboration benefits and their de-problematisation*. The second hypothetical track was that this meta-governing role of business works supplemental to state meta-governance in terms of process management. Whilst business organizations encourage local governments to undertake ‘serious’ metropolitan collaboration, such as land-use planning at the metropolitan scale, if local government association do undertake this task in Germany, its process and outcome will no longer be voluntary but governed by state law that requires the production of a concrete document. The study hypothesised that this complementary meta-governance by the business and state towards effective metropolitan governance works under a mechanism in which when local governments step with optimism in the process of metropolitan planning, they are prevented from returning to the comfort zone in encounter with conflict but have to find a way forward. Persistence in conflict with tactics adjusted to a perspective of agreement was argued to result in effective governance in the middle of the spectrum between lowest common denominator and paralysing conflict.

6.2 *The In-depth Case Study*

In order to test the hypothesis, the exemplar method of case study selection was applied with the logic that a most prepared laboratory would contribute to the precision of this first-time examination of variables and relationships. With the exemplar lens, the Ruhr metropolitan area was chosen for this study. The hypothesis passed the test; it was thus elaborated with empirical findings under the two sections of persuasion and political response as follows:

1. Under persuasion, business organizations used two arguments to de-emphasize procedural complications of collaboration (whereby conflict is framed as misunderstanding). The first argument implied smart specialisation whereby if every locality selects a limited number of investment priorities based on its strengths and comparative advantages, competition and collaboration will be reconciled. The second argument related to the incremental effects of learning and relationship building whereby more in-depth collaboration like joint regional planning can help overcome misunderstandings created in surface collaboration;

2. Again, under persuasion, in order to de-problematise and magnify benefits of collaboration, business organizations utilised two discourses. The first discourse built on smart specialisation suggesting that the short-term loss of localities that discontinue investment in fields other than their potential will be reimbursed in the context of mutual restraint by others – a process which will then bring about additional benefit for all through enhancement in international competitiveness. The second discourse built on spill-over theories to suggest that the interest of all localities will be met in scaled up collaboration that identifies competitive investment sites as starting points for expansive growth;
3. Under political response, the mechanism in which localities ended up with conflict in regional planning was mainly disillusion with smart specialisation; there were many administrative divisions all of which wanted to specialise in a few fields of economic activity.
4. Again, under political response, the mechanism in which obliged persistence in the conflictual process of regional planning led to effective governance was that stakeholders decided to seek meta-consensus on the basics of decision making to find a way forward. That meta-consensus was sought with appreciation for the fact that the conflict they were in had to result in an agreement. It enabled a subsequent exercise of strategic sites identification to result in a limited number of priorities that were acceptable to all who had either benefited directly or felt they had been given political manoeuvre in a transparent process whose scientific factors outweighed political ones.

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Economic returns of transferring post-coal mine land to grazing land in the Bowen Basin: Is this a new opportunity for rural development in Australia?

**Delwar Akbar, John Rolfe, Megan Star,
Jo-Anne Everingham and Susan Kinnear**

Central Queensland University and University of Queensland, Australia

d.akbar@cqu.edu.au

ABSTRACT

Most coal mines in the Bowen Basin of Queensland, Australia are at a mature stage. A number of these coal mines have been rehabilitating their mined land progressively with a view to relinquishing their mining leases once production finishes. The original land use of most mining leases in the Bowen Basin was grazing. Some studies have found that transferring such post-coal mine land to its original use of grazing was the most acceptable land use option in the eyes of local landholders. However, the actual costs and benefits for the future land owner are unknown. This study examines the direct costs of managing such land for grazing, as well as the direct benefits from beef production in the Bowen Basin region. The study found that the expected return is \$97/ha/year. This is the net return, broadly equivalent to average revenues less average operating costs. The implications of these estimates are that if post-mining land could be returned to grazing capability with no additional management requirements or caveats on the title, it would generate increased agricultural production and contribute to rural development in mining regions of Australia.

ACKNOWLEDGEMENT

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1. INTRODUCTION

Coal mining has been a major industry in the Bowen Basin since the mid-1970s, with rapid growth triggered by the resources boom from 2003 to 2012. In 2015 there were 52 operating mines in the Bowen Basin, however five were not operational (Rolfe *et al*, 2018). The overall age of operations, combined with structural decline in the resource sector, means that there will be an increase in the number of Bowen Basin mine closures (Everingham *et al*, 2018), either because the reserve is depleted or it has become uneconomic.

Substantial areas of central Queensland are disturbed by open-cut coal mining, with this varying from severely impacted lands to areas in various stages of rehabilitation. EPA (2007) estimated that coal operations in Queensland had disturbed a total of 95,619ha out of a total 146,424ha of

mining-disturbed land in 2006, with 26,705ha of that disturbed land rehabilitated to some degree. Assuming the then-estimated annual increase of 5,619ha of additional disturbance (EPA 2007) continued to 2016, and assuming that coal mining continued in the same proportion of overall mining lands (65%), there are an estimated 202,000ha of mine disturbed land in Queensland, with approximately 132,000ha attributable to coal mining. This matches closely with the estimates of the Queensland Government (2016), where they identified that 220,000ha were disturbed by mining in Queensland, with only 9% currently rehabilitated. On these estimates, approximately 0.9% of the Bowen Basin land area has been disturbed by mining. The region does not welcome the prospect of growing areas of vacant, depleted, and unproductive land. Consequently there is considerable interest in agreeing productive uses that will make post-mining land an asset for regional development.

A comprehensive approach to considering disturbance of mined lands involves not only the extent and nature of disturbance, but also the stage of rehabilitation of each domain. The different domains of an ex-mine site (such as pit, tailings, spoil heaps, revegetated areas, off-set zones and locations of decommissioned infrastructure) pose varying degrees of risk and need to be considered separately in packaging for post-mining use (Doley and Audet, 2013; Grigg, Mullen, Byrne and Shelton, 2006). This is important because progressive rehabilitation is focussed on minimising the net area of disturbance and ensuring that ecological function and/or agricultural production is restored as soon as possible to the bulk of the land. This paper aims to identify the costs and benefits of transferring post-coal mine land to grazing land in the Bowen Basin.

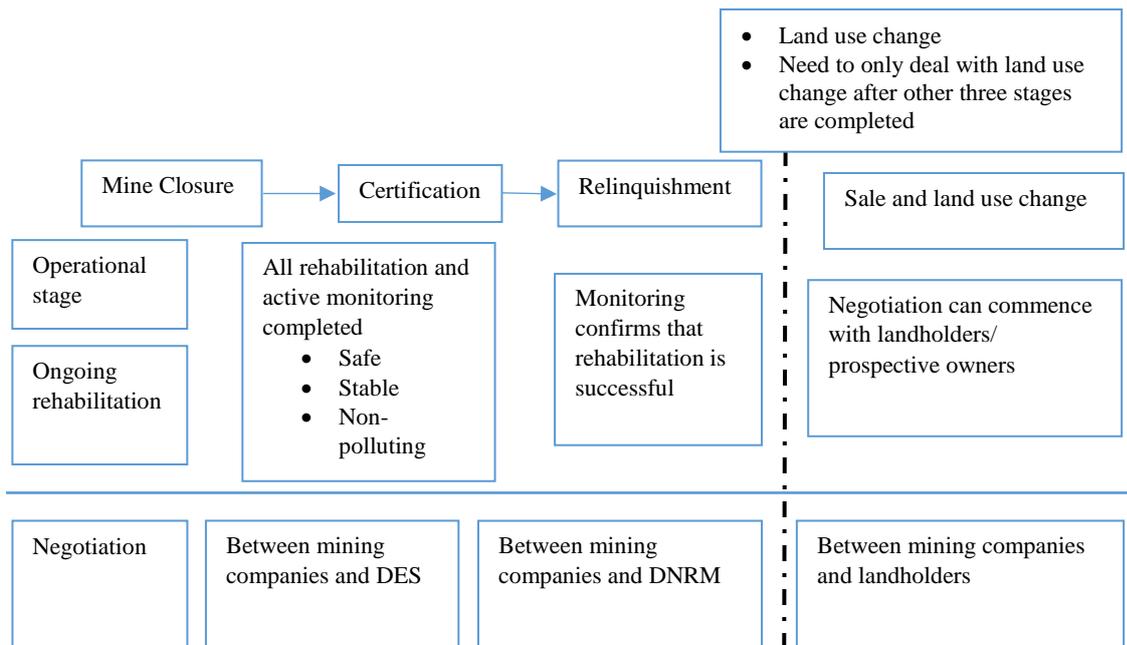
This section has introduced the research focus. The processes of mine closure and land use change are summarised in the next section, followed by an overview of the methods used in this case study. The economics of returning mining lands to grazing is presented in sections four. This paper concludes in section five with a brief discussion on the implication of the study findings towards future rural economic development in the Bowen Basin region.

2. PROCESSES OF LAND USE CHANGE OF EX-MINE LAND

Mining operations often occur over fifty year time periods, although some mines have operated for longer. Mines close for two predominant reasons: depletion of resources in the mine site or operations becoming uneconomic. Closure of a mine brings many social, economic and environmental impacts on its areas of influence (Peck *et al*, 2005). Preparation for the economic and land use transitions can help minimise impacts and improve post-mining benefits. End-of-mine life in Queensland comes after years of planning and rehabilitation for mine closure. Once production ceases, a two-step sequence follows of certification and relinquishment of a closed site to a third party for different use(s) (Figure 1).

First a company will complete rehabilitation activities. Although mines should be progressively rehabilitating through the mining period (Rolfe *et al*, 2018), some areas of a mine site may not be available for rehabilitation until shutdown because of operational needs (e.g. haul roads). Hence, there will normally be a pulse of earthworks, decommissioning of plant and infrastructure, and capping and seeding of tailings and other disturbed areas in the immediate closure period. A second stage of closure is a subsequent ‘active management and monitoring period’ focused on establishing vegetation, monitoring to confirm that no adverse impacts (e.g. pollution of watercourses or erosion of landforms) are occurring, and remediating any issues that arise (e.g. replanting pasture and trees) (Rolfe *et al*, 2018). Certification is unlikely to occur until this period is completed, and any alternative land use at this stage is likely to be closely controlled (e.g. restricted grazing access) to ensure rehabilitation is successful.

Figure 1. Stages of Implementing Mine Closure and Associated Costs and Benefits



Source: Prepared by the authors.

The third stage is an extended passive management and monitoring period, intended to ensure that the site continues free of adverse impacts (Rolfe et al., 2018). By this stage all active risks should be managed. The remaining residual risks relate to the risks that some rehabilitation may not be successful (e.g. due to subsidence or erosion) or that there is unanticipated movement of pollutants. Residual risks are expected to diminish over time, however there may need to be controls on land use (e.g. restricted stocking rates, protection against fires) to minimise residual risk. Certification is expected to occur in this period, but may be earlier or later depending on the size of residual risk and other issues. Mine lease relinquishment occurs after certification. Until the relinquishment, the mine companies bear the costs related to the mine site rehabilitation; any future land holder would start investment after the relinquishment. However, relinquishment and land use change can occur at the same time but it varies between cases.

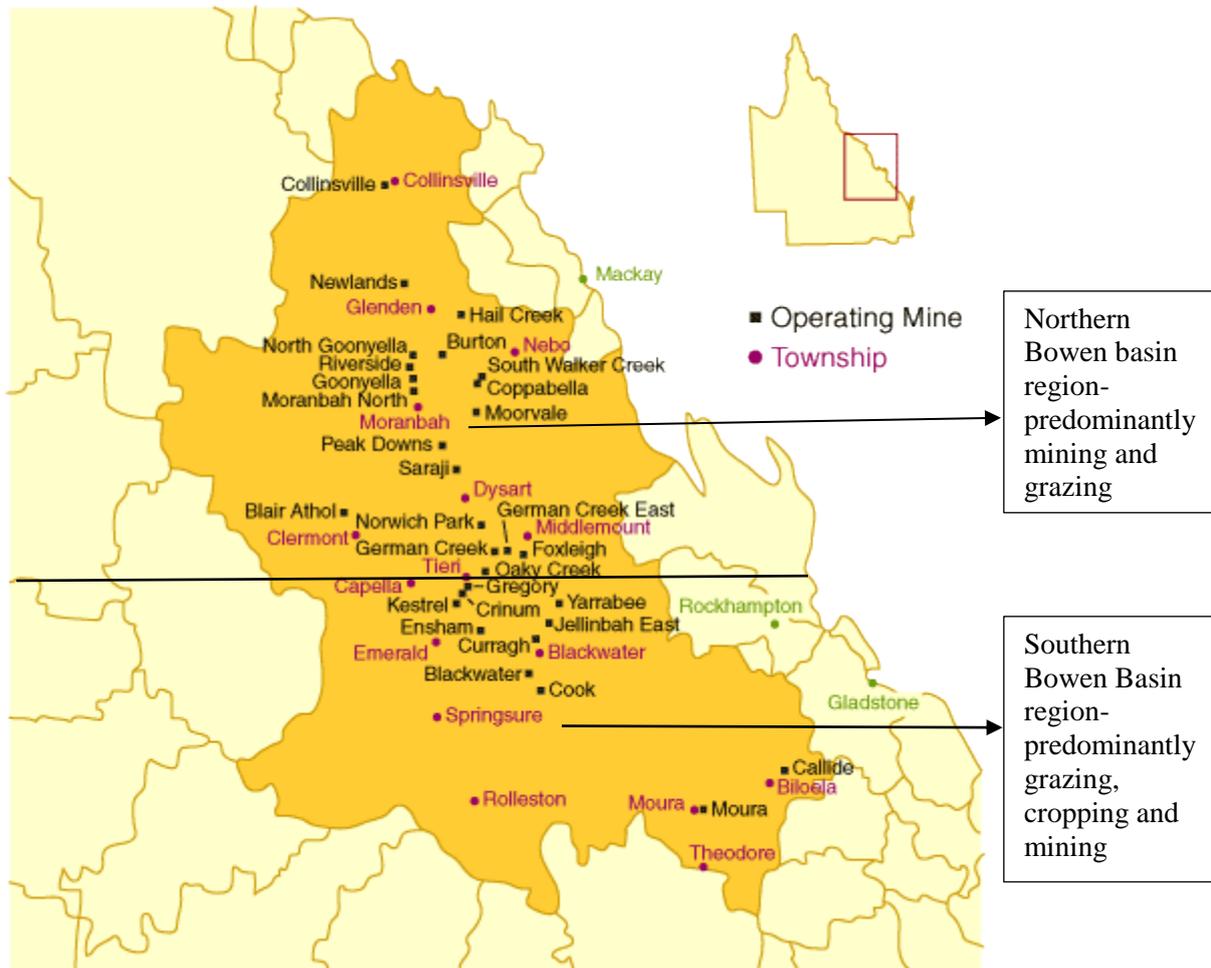
3. METHODS AND CASE STUDY

The study used a combination of qualitative and quantitative approaches to evaluate costs and benefits involved with post-mine land use in the Bowen Basin in Queensland. Qualitative data were collected via four stakeholders’ workshops and quantitative data were collected from secondary sources. Recruitment for the workshops involved a combination of approaches including telephone and email invitations, and snowballing and resulted in participants from multiple sectors with a particular emphasis on graziers as the users and managers of the majority of Central Queensland land.

The Bowen Basin intersects with important agricultural lands in the Fitzroy and Mackay-Whitsunday regions in Central Queensland (Figure 2). The region is predominately used for beef cattle grazing, particularly in the northern part of the Basin. There are more cropping and mixed cropping-grazing land uses in the southern part of the basin, and some irrigation (particularly for cotton) in the Comet, Nogoia, Dawson and Mackenzie River areas. Property sizes tend to be smaller in the southern part of the Bowen Basin and larger in the northern part, as well as larger for less productive land types. The scale and ownership of agricultural operations vary, but most can be classified into three groups:

- family owned and operated enterprises (on a single site);
- consolidated large-scale family operations over several properties; and
- agricultural companies.

Figure 2: Bowen Basin – Location and Land Use



Source: Godwin *et al.* (1999)

Mining companies are substantial landholders in the Bowen Basin, as companies typically have purchased the land to which they hold mining leases (granting sub-surface rights). In some cases the companies have converted the surface land from leasehold to freehold (as companies are precluded from owning some forms of agricultural leasehold title). Mining operations account for approximately 1% of land use in the Bowen Basin, although mining companies own a larger (but unknown) amount of land, as direct mining operations typically occur only on a portion of a land title for two reasons: the original agricultural property was a large block; and/or additional land is required for buffer zone purposes. As mines are often linear in layout and spread across the Bowen Basin following the coal seams, they are in proximity to a number of agricultural enterprises.

Surface areas of most mining leases already have some agricultural use, typically involving the buffer zone. There are three main types of arrangements for current agricultural use of mining lands:

- Lease back to original owner (sometimes negotiated in purchase arrangements)
- Lease to other landholders (usually short term leases to neighbours)
- Operated by mining company itself.

Many mines also have areas of rehabilitated land. These are more sporadically used for agricultural purposes, often only on a trial basis, as most are still in the ‘active management and monitoring’ phase.

4. THE ECONOMIC RETURNS FROM TRANSITIONING EX-MINE LAND TO GRAZING LANDS

Twenty-four of 26 workshop participants supported grazing or a combination of grazing and conservation as the most appropriate post-mining land use for the Bowen Basin. The outcomes of the workshops and other research data indicated that, before taking on post-mining land for grazing purposes, a grazier would first consider a range of issues. Notable among these were economic issues across three categories:

- Expected returns from production;
- Direct costs of site maintenance and monitoring; and
- Indirect costs of impacts on title, responsibilities and shared access to site.

Expected returns from production of beef cattle grazing can be estimated from either a herd modelling approach, gross margin analysis, or an asset valuation approach (REF). The asset valuation approach is selected here as the simplest to present because it essentially represents the returns after all variable costs of cattle management have been accounted for. This approach involves two steps:

- Convert sale prices for grazing land in the Bowen Basin into livestock equivalents (value per beast area)
- Convert the values per beast area into annual equivalents.

The annualised beast area values provide an indication of what buyers of agricultural land consider to be the annual return after operating costs have been accounted for. This study adopts Herron Todd White’s (2015) values per beast area (AE) for grazing properties on better quality land in Central Queensland where there are normally 3-5 hectares of land required per beast area (Table 1).

The results demonstrate that the expected return per beast on grazing lands in the Bowen Basin region are approximately \$3,156 or \$253 per annum. In area terms, the expected return is \$1213/ha, or \$97/ha/year. This is the net return, broadly equivalent to average revenues less average operating costs. The implications of these estimates are that if post mining land could be perfectly returned to grazing capability with no additional management requirements or caveats on the title, the expected demand would be approximately \$3,156 per beast area or \$1,213 per hectare. As the rural property market increases (or decreases) in the Bowen Basin region from those 2015 values, then the values will change accordingly.

Table 1: Land and Beast Values for Central Queensland

District and land type	Land value (\$/ha)	Annualised land value (5% discount rate)	Beast value (\$/AE)	Annualised beast value (5% discount rate)
<i>Moura/Rolleston Scrub</i>	\$1,600 - \$1,850	\$128 - \$148	\$3,250 - \$4,000	\$261 - \$321
<i>Central Highlands Scrub</i>	\$1,250 - \$1,600	\$100 - \$128	\$3,000 - \$3,500	\$241 - \$281
<i>Central Highlands Downs</i>	\$750 - \$1,100	\$60 - \$88	\$2,500 - \$3,000	\$201 - \$241
<i>Alpha Scrub</i>	\$675 - \$875	\$54 - \$70	\$2,750 - \$3,250	\$221 - 261
Average	\$1,213/ha	\$97/ha	\$3,156/AE	\$253/AE

Data sourced from Herron Todd White (2015).

4.1 Potential Adjustments to the Preliminary Estimates

There are three important adjustments to these preliminary estimates that may be relevant.

Lower productivity of post-mining lands: Discussions with landholders in the workshops revealed that the productivity of lands rehabilitated to grazing was expected to be lower than standard grazing country. Four reasons were identified for this:

- Not all land in a mined area may be returned to grazing (e.g. voids may be fenced off),
- The water holding capacity of rehabilitated soils may not be as high as intact lands,
- There may be management conditions that limit grazing pressures and activities, particularly in very wet and dry conditions, and
- Pastures on rehabilitated lands may decline over time as the benefits of initial fertilisation wear off.

It proved difficult to identify a ratio of grazing productivity between post-mining pasture lands and un-mined pasture lands. There are few assessments of the results of cattle grazing on mine rehabilitation pastures, although Grigg *et al.* (2002; 2006) (ACARP Project C9038) are a notable exception. In that study the research identified sustainable stocking rates at sites on the Blackwater and Norwich Park mines of 2.7 and 2.2 ha/head respectively, which were comparable with improved pastures on unmined land in the region. However predicted sustainable stocking rates for a site at the Goonyella Riverside of 5.9 ha/head were lower than on unmined land.

However some indication of expected productivity was generated from the workshops that were conducted as part of this ACARP project. Data was collected from six workshop participants on their assessment of the productivity of rehabilitated lands compared to undisturbed grazing land. Using the mid-points of the categories that were offered (e.g. 0-20%, 20-40% and so on), the average productivity of post-mining relative to undisturbed land was identified as:

- Land that has been open-cut mined, then rehabilitated: 65% as productive
- Land that has been underground mined, then rehabilitated: 80% as productive

- Highly disturbed land, e.g. spoil piles, mining pits, wash-down areas: 20% as productive

For the purpose of this exercise it is assumed that productivity will be between 25% - 75% of normal grazing lands:

- 25% means that a lower proportion of the mine site is available for grazing, pastures are not as productive, and there are more restrictions over the grazing of sites.
- 50% means that a moderate proportion of the mine site is available for grazing, pastures are reasonably productive, and there are some restrictions over the grazing of sites.
- 75% means that a higher proportion of the mine site is available for grazing, pastures are close to being fully productive, and there are limited restrictions over the grazing of sites.

Direct costs of site management and monitoring: There may be additional requirements for management associated with a post-mining land use, particularly for items such as:

- Monitoring
- Weed control
- Firebreaks
- Maintaining fences around exclusion zones
- Water infrastructure (watering points/pipes) monitoring and repair
- Minor repairs (e.g. washouts from cattle pads).

This exercise assumes that, on average, a constant amount of 10 additional days labour will be required for these activities.

Implicit costs of owning a post-mining property: Landholders on a post-mining site will not have the same unencumbered title and use of the land that would be expected of a normal grazing property. This is because there may be:

- Conditions on the title
- Contractual obligations to manage the land in particular ways
- Requirements to allow access to 3rd parties for monitoring and management
- Risks of rehabilitation failure (particularly in extreme conditions)

One example is available of the expected impact of a mining vegetation offset on the value of a grazing property in the Bowen Basin. The vegetation offset has been contracted by a mining company on a separate grazing property with a total area of 9,000 hectares. This offset is for approximately 200 hectares with annual inspections and monitoring over a 15 to 20 year period. The landholder will not have any direct costs. A Central Queensland valuer has estimated the negative impact of the vegetation offset on market value of the property because of the 'blot on the title' at \$50,000 for the 200 ha¹.

Market apprehension about taking on the title over a post-mining land parcel is likely to exist because:

- Banks are reluctant to lend against encumbered titles
- Banks and landholders are reluctant to fund/purchase land with potential risks
- Landholders are reluctant to have conditions or requirements on land

1 Data provided to the research team as confidential basis.

The extent of impact on land values can also be expected to vary according to the area of the land affected and the severity of the conditions involved. Nevertheless, for the purposes of this exercise, impacts on title are based on the \$50,000 for 200 ha estimate.

4.2 Bowen Basin Case Study Exercise:

Assume 1,000 hectares of rehabilitated land is returned from mining to grazing use. The land will require some level of ongoing monitoring and management to ensure that rehabilitation is successful, and this is associated with covenants on the title to ensure that the management conditions are complied with. The additional costs are assumed as follows:

- Maintenance costs = 10 additional days per annum for weed control and maintenance of fences and firebreaks, with machinery and equipment included = \$10,000
- Impacts on title = \$50,000 x 5 (1,000 ha of land) amortised at 5% = \$20,000 per annum

Table 2 Economic Returns on Post-Mining Land under Three Productivity Scenarios

Factor	Grazing Land	Post mining land		
		75% productive	50% productive	25% productive
Annual net return (1000 ha x \$97)	\$97,000	72,750	48,500	24,250
Maintenance costs	\$0	\$10,000	\$10,000	\$10,000
Impacts on title	\$0	\$20,000	\$20,000	\$20,000
Total annual return	\$97,000	\$42,750	\$18,500	-\$5,750

The results of this illustrative example show that expected economic returns from grazing rehabilitated mine lands could vary between 44% and -5% of the returns from undisturbed grazing lands. Values for post mining land will be higher with:

- Increased productivity
- Lower additional maintenance costs
- Lower impacts on title

5. CONCLUSION AND OPPORTUNITIES FOR RURAL DEVELOPMENT

Identifying post-mining land use is an important step to complete rehabilitation and certification processes for mines in closure stages. However, the economic returns that the next user/owner within the Bowen Basin can expect are currently not very clear. While it appears that agriculture is the major land use relevant to post-mining in the Bowen Basin, there are several issues that mean that the transfer from mining to agriculture may be complex but could be achievable. For example, Grigg *et al.* (2006, p. 13) found “Local graziers were typically enthusiastic about the potential for grazing as a post-mining land use, with a number expressing interest in stocking areas of pasture rehabilitation while the mine was still operating”. This study examined the direct costs of subsequent use of ex-mine land for grazing, as well as the direct benefits from beef production in the Bowen Basin region. The study found that the expected return is \$97/ha/ year or \$253/AE. This is the net return, broadly equivalent to average revenues less average operating costs. The implications of these estimates are that if post-mining land could be

returned to grazing capability with no additional management requirements or caveats on the title, it would generate increased agricultural production and contribute to rural development in mining regions of Australia.

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Assessing the Impacts of Extreme Weather Events on Selected Fruit Production in Central Queensland, Australia: A Relational Analysis Using Flood Data

Mst Sabrina Haque, Delwar Akbar and Susan Kinnear
Central Queensland University, Australia

s.haque@cqu.edu.au

ABSTRACT

Australia's weather has changed significantly over the last few decades and weather patterns are becoming more unpredictable. Extreme weather events (EWEs) pose potential threats to agri-businesses, households and the community, by changing resource availability, supply chain patterns and even the behaviours of consumers and shareholders. This is particularly the case for food chains based on crops that are vulnerable to extreme weather. The Central Queensland region has been subjected to several EWEs since 1999, yet the impacts of these events on local food production chains have not been examined in detail. To address this gap, this study examined the impact of EWEs on the production of three tropical fruits (pineapple, mango and lychee) in Central Queensland. Meteorological data relating to flood heights were collected from the Bureau of Meteorology and fruit production data specific to Central Queensland were extracted from the Australian Bureau of Statistics for the period 1999-2017. The analysis used a polynomial regression model to identify the relationship(s) between flood (as an example of a EWE) and the production volumes of the three selected fruits. Flood events were found to moderately affect mango and pineapple production, but were associated with very little effect on lychee production, probably because of the timing of floods compared with critical crop growth and harvesting cycles. These findings are important in improving an understanding of the linkages between extreme events and fruit production. However, the results should be interpreted with caution given that this case study was limited to localised flood data, rather than using comprehensive modelling of regional rainfall and other variables, which would better reflect the geography of the fruit production areas.

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1. INTRODUCTION

Australia is acknowledged as one of the developed countries that is most susceptible to negative impacts from global climate change. One of the key ways in which climate change influences Australia is through an increased frequency of extreme weather events (EWEs). Experts predict that in future EWEs may result in approximately \$3.2 billion in losses relating to Australian

fruit farming industries (Hull, 2016). The risk of negative impacts on tropical fruit farms is considered highly likely, due to the expected increase in a range of EWEs such as storm surges, cyclones, floods, and heatwaves, because each of these events may impact on fruit growing regions. In Australia many of the fruit growing regions are coastal, and coastal areas are more susceptible to extreme weather such as storm surges and cyclones, which are not experienced inland.

Fruits are Australia's third largest horticultural industry (Thomson *et al*, 2014) with a farmgate value of \$4,859.5 million per annum in the 2016-17 financial year (HIAL, 2018). According to ABARES (2018, p. 77) it is anticipated that the value of fruit production will expand from \$3.9 billion in 2017-2018 to \$4.6 billion in 2022-23. The state of Queensland is responsible for producing the majority of Australia's bananas, pineapples, mangoes, mandarins, avocados and many other fruits (QFF, 2017), which are significant contributors to the state and national economies and food production. However, this sector is under increasing vulnerability because of EWEs. For example, according to the Queensland Farmer's Federation (QFF), tropical cyclone Debbie caused around A\$100 million losses in fresh fruit industries (Sinclair *et al*, 2017). In terms of fruit production, EWEs are also causing indirect losses in the economy. Due to unpredictable temperature and rainfall patterns, the phenology of commercially grown fruit varieties are changing, and this affects fruit maturity dates (FMD) (Liu *et al*, 2016) as well as fruit quality and quantity (Cosmulescu and Marius, 2016), with subsequent ramifications throughout the supply chain.

Several Australian studies have attempted to identify the impact(s) of EWEs on pome fruits (Darbyshire *et al*, 2015; Thomson *et al*, 2014) and citrus fruits (Deuter, 2008), but very little work has been done in the field of tropical fruit production in terms of weather variation. The study presented in this paper employed a simple linear regression model to identify the relationship between EWEs and fruit production, using a case study of Central Queensland. The findings of this study will be useful in allowing growers and other industry stakeholders to estimate the prospective reductions in production tonnages due to EWEs, thus informing adaptation strategies and response plans. This paper has been structured as follows: section 2 describes a relational framework for EWEs and fruit production, which is then followed by the case study and methodology in sections 3 and 4. Section 5 briefly presents the findings and analysis and section 6 reports the conclusion.

2. EXTREME WEATHER EVENTS AND FRUIT PRODUCTION: ANALYSIS TOOLS

EWEs have devastating impacts on fruit production (Cosmulescu and Marius, 2016; Liu *et al*, 2016). Already, several studies have conducted historical trend analyses to determine the relationships between EWEs and fruit production, although these have used a range of different modelling approaches (Figure 1).

For example, Williams *et al*. (2017) conducted trend analyses for the period 1995-2014 using climate (e.g. rainfall and temperature) data and annual pineapple production data from Ghana. In that study, the researcher developed a linear model to identify the trend changes over time, which revealed that temperature variations have more significant impacts on pineapple production than do rainfall variations. Similar results have also been derived by Cosmulescu and Marius (2016), where climate data have been obtained for the period 2004-2013, and multiple correlation analyses were performed to determine the impacts of air temperatures on fruit orchards in Romania. That study concluded that even small changes in annual average temperature variation (e.g., changing from 10.5°C to 12.4°C) have negative influences on fruit production.

Figure 1: Summary of Methods Used to Identify the Relationship between EWEs and Production Volumes

- Correlation analysis has been performed by using pineapple growing period climate (temperature & rainfall) data from 1984 to 2014.
- Stepwise regression analysis has been performed to determine a suitable model by using bimonthly harvest data of fruits and daily rainfall and maximum daily temperature from 1995 to 2015; furthermore cross validation (CV) methods are used to evaluate the models.
- Linear mixed models are used to analyse the sensitivity of crops to EWEs by using crop production data and weather data from 1991 to 2014.
- Fixed effect model has been performed to measure the impacts of EWEs on crops.

Sources: Adopted from Mäkinen *et al.* (2018), NDA (2000), Pagani *et al.* (2017), Pathmeswaran *et al.* (2018), Rajan (2016), Slaven (2017), Thomson *et al.* (2014), Möllendorff and Hirschfeld (2016) and Williams *et al.* (2017).

Some practitioners have used simple linear regression analyses to assess the EWEs impacts on production volumes (Ramesh and Vishnu Vardhan, 2013; Sellam and Poovammal, 2016). According to Rencher and Schaalje (2008), simple linear regression is a statistical analytical tool for evaluating the relationship between one independent variable and one dependent variable. Simple linear regression analysis is therefore considered as an effective tool for estimating agricultural production over time in terms of EWEs, as it allows for comparing of meteorological and production volume data, as independent and dependent variables respectively (Sellam and Poovammal, 2016).

3. CASE STUDY DESCRIPTION

Study Area

The case study area was the coastal Central Queensland region which lies in the centre of Queensland's eastern coastline, between latitudes $-23^{\circ}26'S \sim 13^{\circ}78'S$ and longitude $144^{\circ}53'E \sim 5^{\circ}80'E$. The Central Queensland region landmass occupies around 117,800 km² which represents 6.8% of the total size of Queensland (DSD, 2013), yet it supports a population of only 223,000 people (DSD, 2013). Agriculture plays a vital role in the state's economy and the Central Queensland region represents 13% of Queensland's total gross value (RDA, 2013a). For example, according to the SGQ (2018), approximately 24% of the regional workforce in Central Queensland are involved in the agricultural sector. The Central Queensland region is also particularly vulnerable to EWEs associated with tropical storms, floods and cyclones, with 10 severe events occurring in the past 10 years, sufficient to result in a disaster area being declared (GCA, 2018). This is of concern considering that there is already a high frequency of damaging events, and Leslie *et al.* (2007) predicted that the occurrence of severe cyclones will be amplified in the coming 50 years in Australian coastal regions. Garnaut (2008, p. 117) also noted that "by 2030, category 3-5 storms will be increased 60 per cent in intensity".

Rationale for Choosing the Selected Fruits

Fruits grown in tropical climate zones (Underhill, 2003) play an important role in the Australian economy (RDA, 2014). Among many tropical fruits, mango, pineapple and lychee are grown at large-scale in the Central Queensland region throughout the year (Table 1). RDA (2014)

revealed that Queensland's growers contribute about 55% of the national mango crop, and almost all of Australia's pineapples and lychees.

Mango is a tropical fruit with leathery skin. Mangoes are consumed in various ways such as fresh fruit, canned fruit, jam, jelly, juice and pulp which have enhanced the demand for the fruit around the world (HIAL, 2016). Mango fruits are adapted to dry weather, but nevertheless, temperature, flood and rainfall have a leading influence on the tree growth, flowering, fruit growth, size and taste (Rajan, 2016).

Pineapple is a tropical fruit with thick skin and sweet flavour and taste. Pineapples are consumed in various ways such as fresh fruit, canned fruit, jam, jelly and juice. The suitable temperature for pineapple cultivation is 32°C/20°C (day/night) and it appears that production reduces by around 6% for every 1°C temperature variance. Pineapples are also intolerant to drought, needing 600- 750mm annual rainfall to grow effectively (SGQ, 2010-2018b).

Lychee is a tropical fruit native to China and was introduced to Australia in the 1970s (Menzel, 2000). Lychee fruit has a beautiful colour and mouth-watering taste. However, high surface temperatures (above 20°C) affect the colour and taste, and frost and rainfall events during flowering can ruin their production (SGQ, 2010-2018a).

Table 1 Seasonality of the Selected Fruits in Central Queensland

Selected Fruits	Flowering	Picking
Mango	June-July	Kensington Pride: Sep-Mar R2E2: Nov-Feb Honey Gold: Nov-Mar Brooks: Feb-Apr
Pineapple	12 months to grow	September-December
Lychee	June-July	November-January

Sources: ALGA (2018); Cluff (2017); FPJ (2011-2018); HIAL (2018).

Given the growing conditions and ecology of these three fruits, it is anticipated that they are particularly vulnerable to EWEs (RDA, 2013b). Key examples of the negative impacts that EWEs may have on these crops are summarised in Figure 2. Therefore, this study has chosen these three tropical fruits as examples of the damaging impacts that EWEs may have on production volumes (and therefore, on supply chain value).

4. METHODOLOGY

This study adopted quantitative methodology supported by literature review, secondary data collection and analysis. The flood and fruit production data were collected for the period 1999-2017 for the Central Queensland region. The fruit production (tonne per hectare) data were obtained from Australian Bureau of Statistics (ABS). Flood data (i.e., water height in the Fitzroy River at Rockhampton) for the Central Queensland region were obtained from Bureau of Meteorology (BoM).

Methods

To evaluate the impacts of EWEs on fruit production, an Excel-based polynomial regression model was used. As the flood is not a regular phenomenon in central Queensland compared to growing tropical fruits, therefore this study chose polynomial regression instead of simple least

square linear regression. In the data analysis stage, EWEs (i.e., flood data) was considered as an independent variable and fruit production was considered as dependent variable. The results were interpreted in terms of R² values for each model developed for each fruit. However, it is important to note that a clear delimitation of this study was that the case analysis used only flood data based on the Fitzroy River water heights at Rockhampton, instead of considering all areas of specific flood events within Central Queensland.

Figure 2: Key Types of Impacts that EWEs Have on Tropical Fruit Production

- Rainfall and temperature variability affect pineapples' flowering, growth and fruit taste; high temperatures (>40°C) cause sunburn and cracking of fruits.
- Mango and lychee fruits are also highly sensitive to all EWEs; since these are tree fruits and hence are endangered by cyclones.
- Droughts cause flower and fruit dropping of all these fruits; and
- Floods are very harmful for plant growth and it makes the roots softer and they become unable to grow.
- Strong winds may impact multiple stages of production (for example, knocking blossoms from trees or knocking immature fruit from the canopy trees).
- Extended periods of hot days or cold days may impact on the natural growth pattern of the fruit, thus changing the timing at which fruits are coming onto the market.

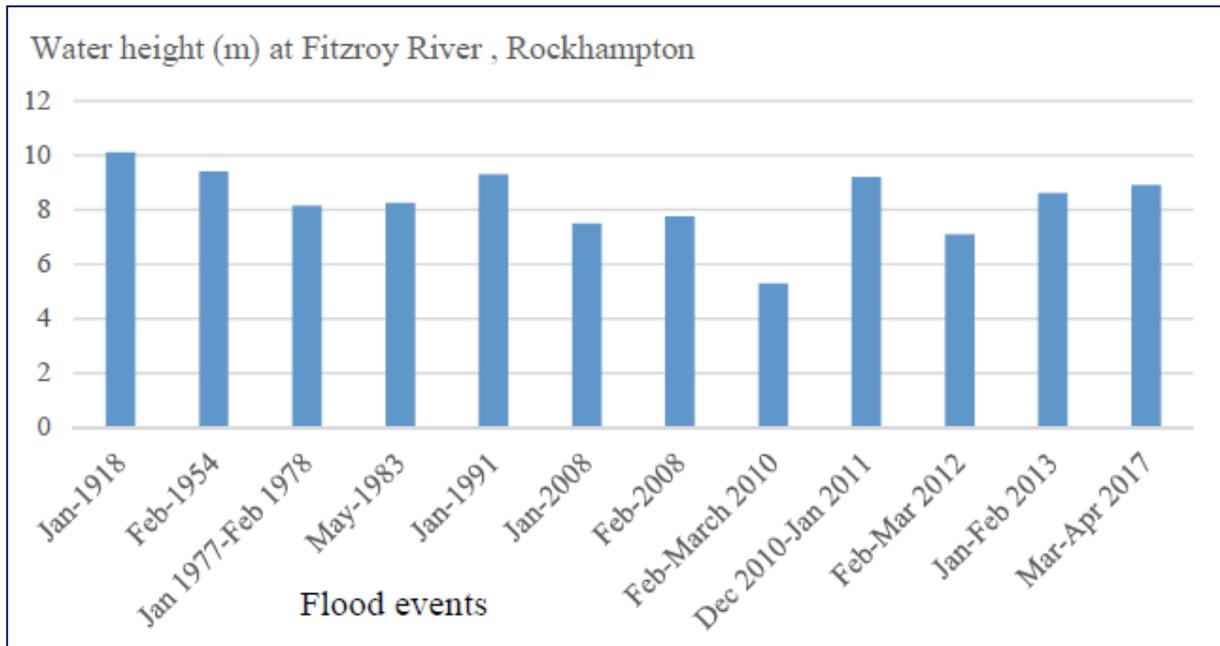
Sources: Adopted from Mäkinen *et al.* (2018), NDA (2000), New Zealand (2008), Pagani *et al.* (2017), Pathmeswaran *et al.* (2018), Rajan (2016), Slaven (2017), Thomson *et al.* (2014), Möllendorff and Hirschfeld (2016), SGQ (2010-2018a) and Williams *et al.* (2017).

5. FINDINGS AND ANALYSIS

Data for peak water heights at the Fitzroy River, Rockhampton has been used here as a proxy for the flood data between 1999 and 2017. The mouth of the Fitzroy River meets with the Pacific Ocean at Port Alma near Rockhampton; and many other smaller tributaries flow into the Fitzroy, which is the second largest exoreic drainage basin in Australia. Therefore, for the purposes of this study, peak water height at the Fitzroy River, Rockhampton can be used as a flood proxy for the whole Central Queensland region. Major flood events are shown in Figure 3, which illustrates that frequency of flood event is much higher in the last 10 years compared with the remainder of the last 100 years.

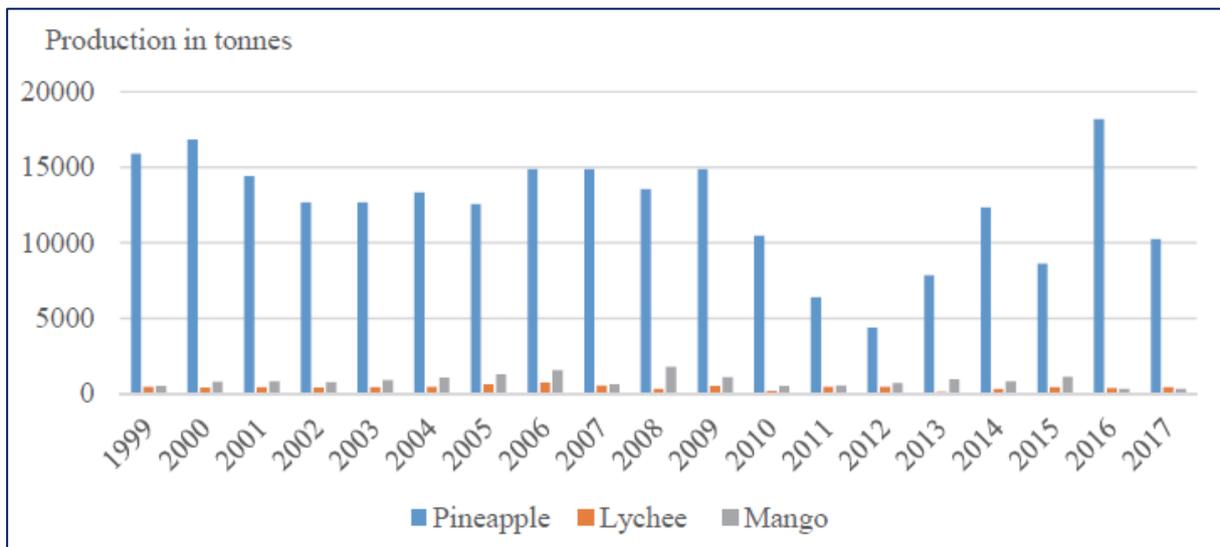
This study used production data of three fruits, i.e., pineapple, lychee and mango between 1999 and 2017 (Figure 4). However, it is very difficult to understand the impacts of flood on the production of these fruits by comparing the flood and production data. By way of illustration, comparing the years 2005 and 2008 shows that 2008 was a flood year, and yet mango production in 2008 was higher than that of 2005. On the other hand, mango production between 2010 and 2013 is much lower than the 2008 production, which were all flood years. Therefore in the former case, it would seem that there is no relation between flood impact and the mango production but in the latter case, a relationship between mango production and flood events does emerge (Figures 3 and 4).

Figure 3: Major Flood Events at Rockhampton, Queensland: 1918 to 2017



Data source: BoM (2018).

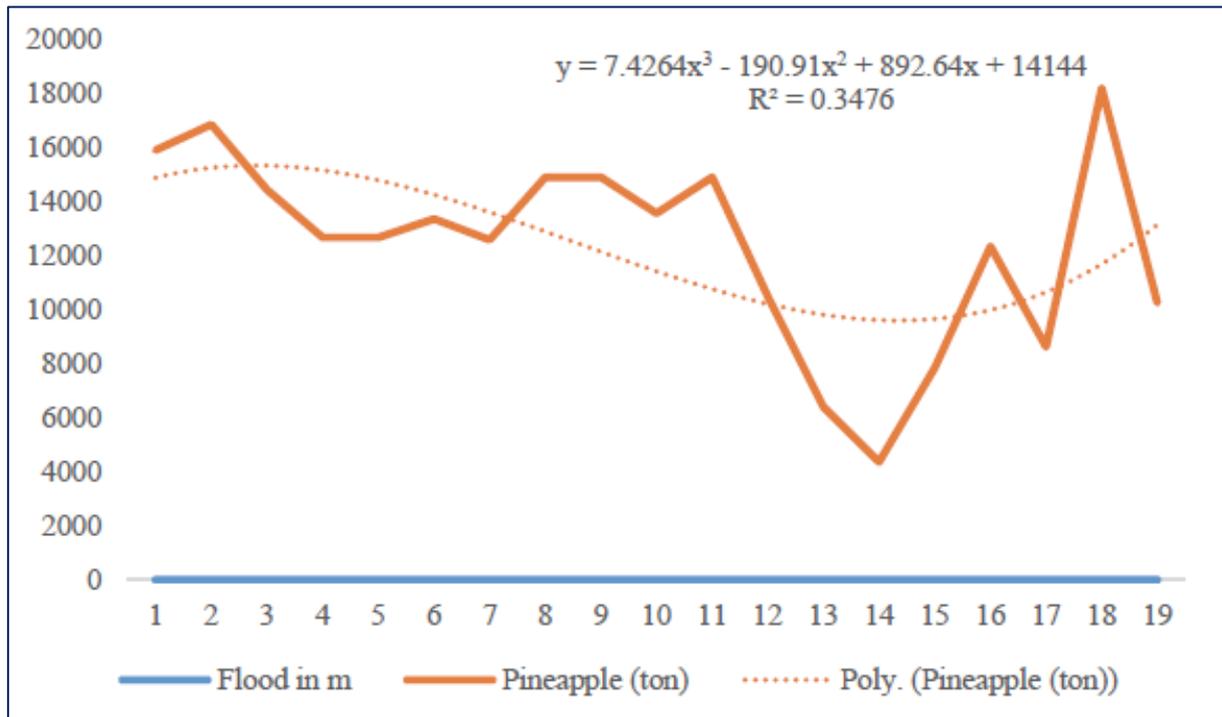
Figure 4: Pineapple, Lychee and Mango Production in Central Queensland: 1999 to 2017



Data source: ABS (1999-2017).

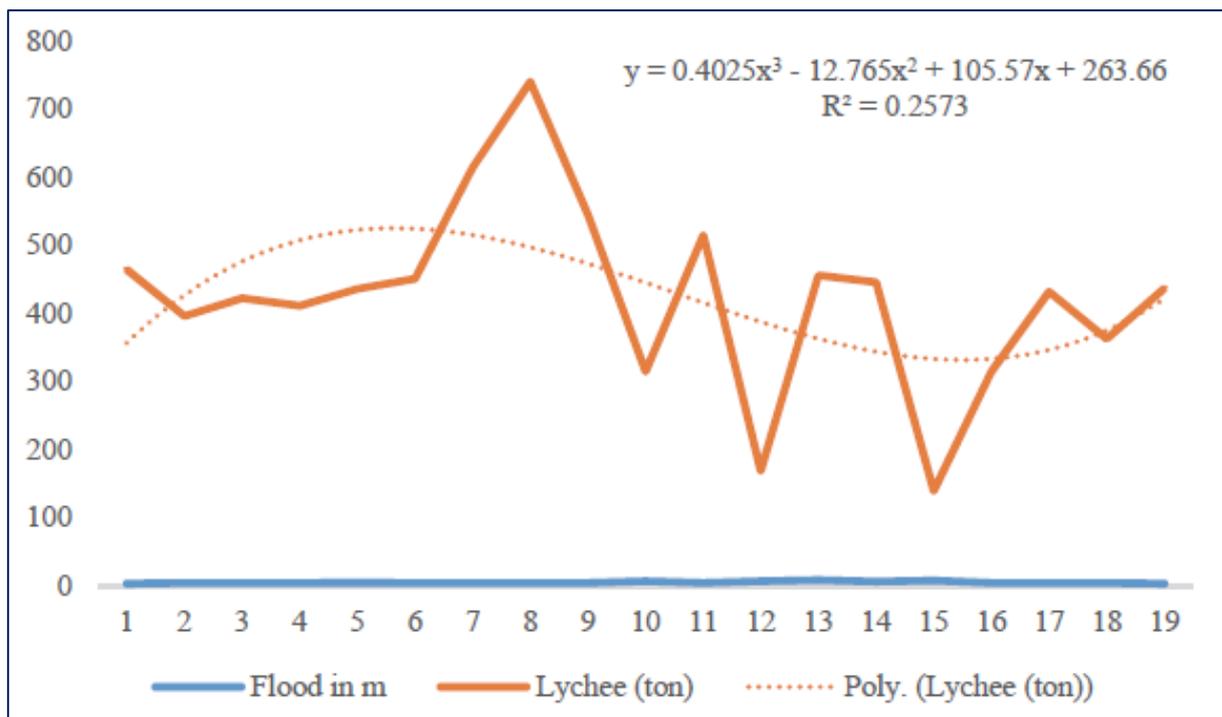
Clearly, a simplistic visual approach is not sufficient to discern relationships in the data. Therefore, this study used polynomial regression models to understand the relationship between flood events and production of the three fruits in Central Queensland. Here, R^2 values were used to explain relationships. R^2 is also known as the coefficient of determination. R^2 measures the strength of a relationship and this relationship value varies between 0 and 100%.

Figure 5: Relationship between Flood Events and Pineapple Production in Central Queensland



Data sources: ABS (1999-2017); BoM (2018).

Figure 6: Relationship between Flood Events and Lychee Production in Central Queensland



Data sources: ABS (1999-2017); BoM (2018).

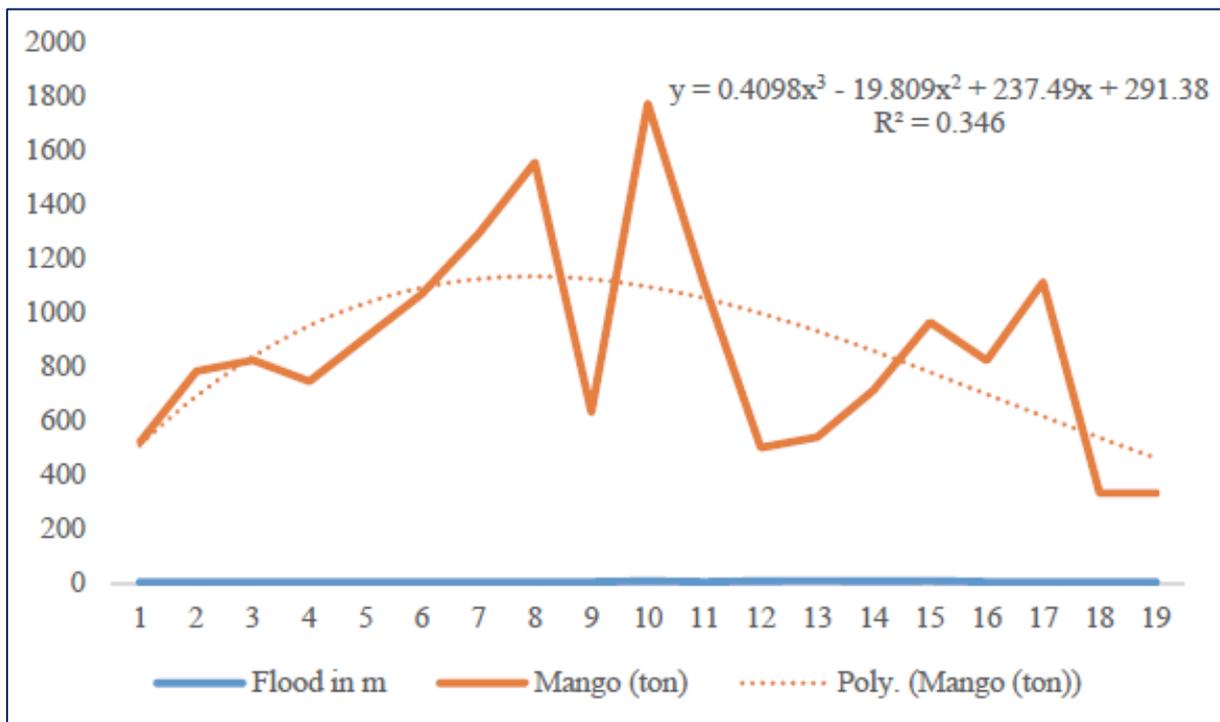
Figure 5 ($R^2 = 34.76\%$) shows that there is a moderate level of relationship between the occurrence of flood events in the Fitzroy River and pineapple production within the Central Queensland region.

Figure 6 ($R^2 = 25.73\%$) illustrates a low level of relationship between flood events and lychee production. A possible reason for the weakened relationship compared with that reported for pineapple production, may be because the lychee production cycle is timed to end before the arrival of the subtropical monsoon ('wet') season.

Figure 7 ($R^2 = 34.60\%$) indicates that there is a moderate level of relationship between flood events and mango production. Again, this likely reflects the influence of the mango production and mango picking period, which typically occurs in November-February (for the majority of the varieties), when most floods were reported in the river system.

Among all these three fruits, mangoes and pineapples have been impacted the most significantly by the flood events (Figure 7) because most major flood events have occurred between the months of December and March (Figure 3), which coincides with the harvesting period for most mango varieties. As pineapples take a long time (12 to 18 months) to grow, they can also be affected by floods at any time of the year.

Figure 7: Relationship between Flood Events and Mango Production in Central Queensland



Data sources: ABS (1999-2017); BoM (2018).

6. CONCLUSION

This study examined the impact of EWEs (particularly flood as an example of EWEs) on the production of three tropical fruits (pineapple, mango and lychee) in Central Queensland. An Excel based polynomial regression model was used to identify the relationship(s) between flood and production volumes of the three selected fruits. The results revealed that the flood events moderately affected the mango and pineapple production, but had very little effect on lychee

production. However, these findings need to be applied cautiously as the study only used flood data based on the Fitzroy River water heights at Rockhampton, instead of considering all areas of specific flood events within Central Queensland. Overall, it is expected that this work will provide a valuable contribution to understanding the impacts of floods on fruit production, and assisting in identifying possible adaptation strategies and land use planning for Central Queensland.

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Can Social License Theory Explain the Relationship between Corporate Social Responsibility (CSR) and Community Engagement (CE)? The New Ghanaian Petrochemical Industry Context

Fuseini Inusah, Parves Sultan, Delwar Akbar and John Rolfe

Central Queensland University, Australia

f.inusah@cqu.edu.au

ABSTRACT

Corporations are currently anticipated to engage communities via corporate responsibilities that are far from legal compulsion and profit intent to attracting goodwill. This originated CSR where corporate sponsorships are directed to interest communities for social acceptance. This study explores how social license theory can be extended in the new Ghanaian petrochemical industry context to improve corporate social engagement. Using interviews as the method of data collection, the purposive sampling method obtained 20 useable responses for this qualitative study. The study found that the Ghanaian oil companies are financially oriented with very little CSR intent as they take advantage of the CSR illiteracy of the community. What communities can do to supporting the social license process was also a prominent empirical question suggested for answers.

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INTRODUCTION

Ghana is a West African nation with more than 400 petrochemical companies. The mining industry currently owns 41% export income, six percent GDP, seven percent corporate income, and 21% total government earnings; with at least one million jobs (Debrah and Graham, 2015; Mohan and Asante, 2015). However, evidence showed that poor community engagement where increasing social displeasure is present within the communities (Mensah and Okyere, 2014). As such, the declaration of the country amongst vibrant oil countries is a source of worry for more information to forestall a replication of the existing poor engagement and social apprehensions in the new petrochemical industry (Andrews, 2013; Mensah and Okyere, 2014). Meanwhile, such social apprehensions have generated tools in the developed world to assisting managers and leaders institute positive platforms to settle good working relationship between local communities and industry (Parsons, Lacey and Moffat, 2014). Hence, Benites-Lazaro and

Mello-Théry (2017) found Corporate Social Responsibility (CSR) is the best effective community engagement (CE) tool to propagate sustainable social license (SL).

However, Ioannou and Serafeim (2012) identified social license theory as CSR investigations where community engagement principles are confirmed on social responsibilities, policies and programs for social confidence and acceptance. Sahu and Pratihari (2015) found companies regard CSR literature as the interest of stakeholders; and therefore believe that dwelling in such community engagement can elicit good social testimonies and social license. This has automatically developed an empirical bond between the three constructs (CSR, CE and SL). Demuijnck and Fasterling (2016) defined social license as a basis of CSR and community engagement contract for corporate legitimacy to conduct business projects. Consequently, Araujo and Kollat (2018) found community engagement as an empirical wedge between CSR and social license constructs.

But examiners found very little information on corporate engagement for social license in Ghana; particularly, the petrochemical industry (Andrews, 2013; Arko, 2013; Garvin, McGee, Smoyer-Tomic and Aubynn, 2009). Therefore, this study aims to explore how social license theory can be extended in the new Ghanaian petrochemical industry context to improve corporate social engagement. To do this, section one introduces the research to comprehend the aim; section two describes the methodology used to approach the aim; section three covers a review of literature on social license, CE and CSR to explore how social license theory can be extended to the industry via better CE; section four covers the both the views of company staff and community members to discuss for empirical evidence; and section five embraced discussions and conclusions for future investigations.

CSR, CE AND SOCIAL LICENSE THEORY

The concept of CSR has been examined, yet investigators are still far from identifying a generally accepted definition and theoretical framework to clarify several empirical issues in the mining industry for social license. CSR stresses mutual engagement between companies and communities on resource development where transparency, reciprocity, and cooperation best yields social license (Reddy and Hamann, 2018). CSR goes beyond the legal principles and commitments of any organisation to satisfy local communities for social licence (Frolova and Lapina, 2015). Barcelos *et al.* (2015) disclosed CSR is effectively significant in creating good relationship with communities for social licence. They suggested future investigations on corporate perceptions for positive engagement with communities; with a more representative sampling procedures for social license. But information on CSR in the Ghanaian communities is poor. For instance, a number of findings declared the Ghanaian community is not educated on CSR; especially, in the mining industry, impelling companies to take advantage of them to warrant future tensions and court cases (Andrews, 2013; Mensah and Okyere, 2014). Amegbey, Adimado and Metallurgy (2003) discovered companies of the Ghanaian industry are only profit focus with a cunning CSR tactics; as there are unattended regular oil spills and no concrete intent to help the community. *It is not a surprise that on the one hand companies do what they identify as necessary, whereas communities on the other hand claim to not 'feel' or 'see' the things companies say they do* (Andrews, 2016, p. 15). This automatically derails any possible engagement process to acquiring social license.

Many studies identified CSR and social license theory in Africa as a subject of academic tension where investigators awareness is nearly absent (Egels, 2005; Hamann *et al.*, 2005; Hamann and Kapelus, 2004). Kolk and Rivera-Santos (2018) reviewed 271 literature on the state of research in Africa and found, among others, studies on social license in the African context are yet to open in several dimensions (e.g. community discussions, poverty, informality, etc.). However,

social license is the community's acceptance where the local people work with the company through corporate social impact, contributions, and responsibilities that are willingly absorbed by the company (Darling, 2011). Similarly, SL is a corporate self-regulation via better CE; though this could be achieved through, for instance, compensations on mining impacts, poverty alleviation, malnutrition, and environmental degradation (Lähtinen *et al.*, 2016). But CSR is generally bias on moral and intrinsic foundation; and reduces the noble intent to a marketing tool, as it never considered how communities could aid the social license process (Balmer, Maignan and Ferrell, 2001; Margolis and Walsh, 2003).

As the existing/old mining industry in Ghana already wields informative gaps in CSR literature (Arko, 2013), the situation is perpetuated after the new petrochemical industry was discovered. Kolk *et al.* (2018) declared strong predominant vacancies of society-related and corporate CE examinations where research models and methods are needed in the African region. The tensions and court cases in the industry could become a curse to Ghana if better information is not elicited for the stakeholders. However, like CSR and SL, community engagement has no generally accepted definition but perfectly focuses on social acceptance. Paulina Tindana *et al.* (2007) stressed CE is a complex social concept with no formal definition; but a tool of collaborating in partnership with communities for social license. The concept entails "*building authentic partnerships, including mutual respect and active, inclusive participation; power sharing and equity; mutual benefit or finding the 'win-win' possibility*" (Tindana *et al.*, 2007, p. 1451).

But these findings are disagreed by some investigators, and they believe the current CE concept is not satisfactory enough to obtaining social license; consequentially propelling many communities revoking corporate projects and acceptance. For instance, Preston, Waugh, Larkins, and Taylor (2010) reviewed 689 literature to examine CE in rural communities and found the current concept of CE provides inadequate evidence for community acceptance; and suggested better empirical measurement and analytical tools to overhaul the phenomenon collectively. In support, Kilpatrick (2009) declared CE is fraught on community representations in many CE platforms, as local understanding is usually machinated or ignored. CE information is currently hopeless in the petrochemical industry, as no comprehensive CSR policy framework or regulator ever existed in Ghana (Ofori, 2010). Besides, many of the current companies generally engage in a clandestine perpetuation of racism and institutionalization of alien cultures (like gay and lesbian groupings), compounding the detest of the indigenous Ghanaian cultures (Aratuo, 2015). This further mads CE possibilities in the industry. But the above studies still agree CSR impels CE for social license. Hence, Mirvis (2012) stressed more research to ascertain whether the engagement concept via CSR must follow only known socially responsible companies. In addition, a snapshot of justification in table 1 enforces why the study in Ghana.

Consequently, "*Africa is much less well represented than other regions, and existing studies about Africa have mainly focused on South Africa and Nigeria. This focus has resulted in scant research on other African countries*" (Kolk and lenfant, 2010, p. 241); while that of the petrochemical industry of Ghana is lacking in many directions (Arko, 2013).

RESEARCH METHOD

This study has undertaken an exploratory research approach. Joseph *et al.* (2016) and Du and Vieira Jr (2012) advocated for exploratory research approach for better understanding CSR in African countries context. This study used semi-structured interviews on two petrochemical companies (Goil Oil Company, and Total Ghana Ltd) and the local community members of Secondi-Takoradi in Ghana. Obtaining the views from the two sides, empirical differences and

similarities were unearthed to inform how CE could be extended in the Ghanaian industry for social license. Hence, purposive sampling was used to obtain 20 useable responses (five responses from each company, and 10 responses from the community members- including chiefs, elders and general public). The use of purposive sampling technique allowed flexibility in choice, particularly, in a volatile research field like the Ghanaian industry. Andrews (2016) acknowledged the uncertainty and reliability of collecting information in mining communities in Ghana because of no open relationship between the companies and the people. However, each interview lasted from 60-90 minutes.

Table 1: Justification of African Research at a Glance

Specification	Issues
African context	Discovery of limited understanding of many researchers spanning from; - skewed studies towards the West; and - Poor in-depth investigations on the continent, particularly on CE and SL (Visser, McIntosh and Middleton, 2017; Zoogah and Nkomo, 2013; Zoogah, Peng and Woldu, 2015).
Ghana context	No comprehensive CSR policy regulator ever existed in Ghana (Ofori, 2010); with research vacancies running in different directions (Arko, 2013); etc.
Research myths	Formulated engagement myths in need of more information; e.g. Kolk <i>et al.</i> (2018) found Africa-focus examinations data collection is daunting, hard to commence, and propelling a worry to examiners.
Search engine clues	In a practical search examples, the social scientist is likely to find very limited studies when searched without typing the words: ‘developing countries’, and/or ‘Africa’- unlike other parts of the world; the situation for Ghana is even words (Arko, 2013).

Source: Prepared by the authors.

To strengthen a positive result devoid of bias, the study realised it could not rely on only the sentiments of all parties since, in their usual nature, companies could be defensive to protect their image; and/or some community members could exaggerate or fear to speak up (Ehrnström-Fuentes, 2015). Hence, the study reviewed more literature (see Table 2) to support the investigation; as literature review reduces bias of exclusion or inclusion of information to transparently communicating better results (Crowther and Cook, 2007; Denyer and Neely, 2004).

The review followed Kolk and Rivera-Santos (2018) to developing the steps where 122 papers were elicited. Only papers written in English were considered and each of the 122 papers were finally the base for conclusions. This search took place in the early 2017 when the journal article selection was necessitated to support the qualitative study for empirical results. The principle for the discussions was that the key findings of the next section were identified to further obtain the similarities and differences with other studies on CSR and social license; and hence, clarify the implications of the findings in literature via the interviews and the 122 journals.

Table 2: The Steps Used to Obtain Credible Number of Papers for the Review

Steps	Particulars	Reason	No. of Journals
1. Selected search engines /sources	Scopus, Google, and Science Direct	Familiar and faster for the research team	-
2. Narrow search by identifying selected specific journals	Academy of Management Annals; Journal of Business Ethics; Academy of Management Journal; Journal of Academy of Business and Economics; Journal of Brand Management; Journal of Business Research; Journal of Consumer Research; and others that were deemed fit by the team.	Top-tier journals that were empirically credible to obtain better CSR, CE, and social license information (Carter <i>et al</i> , 2009; Creswell and Creswell, 2017).	579
3. Subjects included	CSR, corporate performance, business acceptance, social responsibility and social license	To keep a specific focused studies on the specific variables	293
4. Manual review	Manually reviewed papers from the year 2000 to 2018	1. CSR gained better empirical grounds from the 2000 and regarded as current from that year (Carroll and Shabana, 2010). 2. To further scale down the search	122

Source: Developed for the research.

FINDINGS AND ANALYSIS

To effectively obtain acceptance of CSR initiatives for social license in natural resource development of modern times, the engagement process of companies should focus on grassroots/community level perspective. Idemudia (2014) combined semi-structured interviews and household surveys to investigate poverty and oil mining in Nigeria to declare that grassroots oriented participation is the best approach in the CE for better social license. Omeje (2004) revealed any company which uses poor engagement, risk inevitable conflicts and violent confrontations from the communities. This idea includes listening to the community members, formulating ways with the local people on solution to their needs with any impositions and identifying corporate issues to community as their own through constant negotiations. The situation in the new Ghanaian industry can be perilous since the tendency of replicating the lack of CSR directions of the old mining industry is eminent (Arko, 2013; Mensah and Okyere, 2014). Hence, this study used unanimous respondents on interviews in Secondi-Takoradi of Ghana to locate views from the companies and the community on how CSR engagement could be extended in the petrochemical industry for social license; and elicited the following views:

Community members

Look, you go round this community to see whether a single person can satisfactorily explain the meaning of CSR; I believe you will never get anybody. Ever since they came we have been hearing unfamiliar words like the CSR and community participation (Respondent 1).

We only heard on radio and TV about CSR several months ago, but they didn't even explain it. The radio and TV people only say companies use it to help communities. But our roads alone can tell you how we are suffering here (Respondent 2).

So, you think this money conscious companies will ever talk to us about any help? Only once a while they come to greet some of our chiefs and elders to make their usual promises and unsustainable personal gives (Respondent 3).

We see them when the youth start showing anger; but we shall see. However, your presence here is good; as this will be the first issue we shall put before our council meeting on Monday. We must be educated on the CSR so that we can stop the companies from exploiting us this bad (Respondent 4).

Their presence in this community is not only unwelcome but dangerous. Can you stand the smell of our sea now? Was it like this when you were here years ago? (Respondent 5).

They are aware that we are a fishing community but they have sent the fish far away from the catchment zone through their daily oil spill and pollutions (Respondent 6).

Very surprising and confronting! We complained, and they only brought soldiers to secure those (Respondent 7).

They are not Ghanaian companies and hardly give jobs to anybody from here. They initially said we are not educated in their field but years after, we now have graduates who they keep promising for seven years now. They engaged more than 90% of their workers from their countries (Respondent 8).

Some of the companies can only offer security roles but that will secretly depend on a clandestine condition that you become a gay or lesbian. As such, many of our youth see it as a stigma to work with them currently- it is that bad. If you can reach the government who did this to us, tell them that this can never continue in future; as they don't even respect our culture and who we are as people (Respondent 9).

They set the rules of the game if any assistance at all to us; because they gave us a borehole at inaccessible location and it collapsed (Respondent 10).

The issue of social license is far from existence in the new industry as the engagement process revealed poorly connected between the parties. Following the above responses, it is clear that CSR is not known in the community and companies are capitalising on their ignorance to make more profits. This has created anger in some parts of the metropolis and some community members sometimes turn down request to be interviewed. A male in about his 50s rejected request on the interview discussions and declared that *"all what we will say to you here amounts to nothing as usual. Many of your type came here but our situation is even getting worse; just nothing! I hope you guys are not up to using us in making money like those companies?"* However, Sekondi-Takoradi is a capital city of Western Region of Ghana. It is the centre of oil activities and popularly known as "oil city". As such, the study observed the economic and social infrastructure like roads, schools, town halls, market places, hospitals, etc. were extremely outdated to a level at which we wonder why it even be called a capital or city. Poverty was clear in the people with very serious sanitary problems. Ironically, e.g., no single road had been reconstructed by the oil companies whose heavy vehicles caused continuous damages. Therefore, these observations propelled conducting interviews for company officials for the final conclusions.

Company officials

This company is international, very conversant with CSR engagement and have created CSR office here; but the officer has been reassigned to other things since CSR engagement is yet on the ground (Respondent 1).

I accept that on our ninth year now, we should be aware that the people need our support; but we really need to gain our financial fitness before we can start giving sustainable help to anybody (Respondent 2).

Though we are not yet up to the mark of our finances, but we gave them boreholes and they refused to use them. Besides, we did a hospital donation programme where we procured 100 hospital beds and distributed to the health centres last year (Respondent 3).

For big financial development like road constructions, building of markets, hospitals and employment is simply the portion of the Ghanaian government; as we pay taxes and royalties (Respondent 4).

In this case, we don't need to consult anybody here other than the government when we decide to assist those communities (Respondent 5).

For example, we have plans to do something in future for their roads, but you don't expect us to inform the people when we are using our money for such big finances (Respondent 6).

Besides, as soon as you give them such chances, they will bring all their demands. It is the responsibility of their government (Respondent 7).

This is very unfair about CSR; it is always about what our company should commit to better the lives of the people, now none of your questions are demanding what the community should be doing for us (Respondent 8).

I admit that we have gay and lesbians amongst our staff, but we don't use employment as a bait to create that in their culture (Respondent 9)

We are aware that their culture is different and we respect that. However, these are personal issues and we cannot tell what is happening in the bedroom. Besides, we don't have bedrooms here and it is the responsibility of our staff on any action after a close of the day. (Respondent 10).

In Africa, many project failure is usually due to poor grassroots (the local people who are directly affected by the corporate activities) consultations and using CSR engagement process as a requirement to make profits. *"It appears that, in Ghana's large-scale mining sector, CSR is primarily about greenwash, or the projection of a caring image without significant change to socially or environmentally harmful business practices"* (Hilson, 2007, pp 46). This study has found reason with Hilson (2007) declaration. Evidently, a critical examination on the above views of the company's staff aggregately reveals the intransigencies of the companies on CE and how social license is not an issue to them. Further research could be instituted with research models to ascertain the fundamental pushers of corporate behaviours; resonating the current international companies intransigencies in Ghana for sustainable engagement.

DISCUSSION AND CONCLUSIONS

First, the study revealed Ghanaian communities are less informed on CSR, where companies in the industry are using the situation to make more profit at the expense of the people; endangering future industry peace (Andrews, 2013; Mensah and Okyere, 2014). The ill-informed nature of CSR with regards to the focus of this investigation, the study has founded a new variable- CSR-illiteracy- for examination, with a suggestion that further formulations of mixed methodologies and models be created to investigate how the antecedents and consequences of CSR-illiteracy affects CE. Second, this examination also identified CE as a

building block with specific variables (participation, mutual respect, sharing power and equity, and a win-win venture) for social licence (Tindana *et al*, 2007). But the quantification of each variable to succeed social licensing is found lacking. We suggest a quantitative research method to unearth the level at which CE could be maintained attractive to the communities of Africa via these specific variables for social license.

Third, current social issues (e.g. gay practices, lesbianism, and racism) revealed by the study can negatively impact on CE; and require in-depth study for more information to handle such issues for corporate performance. The study suggest further research on raising hypothesis to test the synergy between local cultures and foreign staff behaviours of such social variables; and their impacts on CSR engagement. Forth, this study found that CSR and social license are shaped only to concentrate on how the business can interest the society; but silent on what society can do for business growth, where examiners should be worried. Apart from the condemnations of the company staff on CSR, some researchers also criticised any business interest in social contribution as unfounded in moral and intrinsic foundation; and a reduction of CSR to a marketing tool. Hence, instead of CSR, these revelations have also emanated a new variable- Community Corporate Responsibility (CCR) for further investigation in all industries. This study was only focus on the petrochemical industry of Ghana, with time and financial limitations; hence, the generality of the results could be bias given the centralization of the study on only two companies in Ghana. Therefore, we suggest a wider investigative threshold on the topic.

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Government Business Programs and Regional Business Knowledge Transmission by Professional Business Advisors

Alan Labaš and Jerry Courvisanos

Federation University, Australia

a.labas@federation.edu.au

ABSTRACT

Based on research seeking to understand mechanisms affecting the provision of small business advisory services in a Regional (non-metropolitan) Australian setting, by what are called Professional Business Advisors (PBAs), an emergent theme identifies government business programs and initiatives as significant conduits for regional business knowledge transmission. However, those programs and initiatives are also perceived to impose substantial constraints for PBAs providing services in regional communities. The identified constraining factors include issues of financial viability for PBAs, ineligibility of many regional small businesses to access government funded initiatives, capriciousness of government programs, and clash between technology utilisation and infrastructure reliability in some non-metropolitan regional areas. Regional Australian PBAs service a heterogeneous collection of businesses across large geographic areas. Yet, the potential influence that these PBAs have in the process of knowledge transmission is severely constrained by current government programs aimed both at start-up regional businesses and those pursuing organisational growth. Such constraints raise concerns that have regional policy implications.

INTRODUCTION

There is a long-held belief that knowledge is a critical, strategically important, resource for businesses (Grant, 1996; Nag and Gioia, 2012), however, the inherent limitations associated with small business management expertise (Hall, 1992) emphasise the need for small business owner/ managers to continuously improve their managerial skills (Laitinen and Chong, 1999) and education (Peterson, Kozmetsky and Ridgway, 1983). This study adopts the premise that appropriate professional external business advisors may address the limited management knowledge of small businesses helping them develop a sustainable competitive advantage (Chrisman, 1999; Chrisman and McMullan, 2004), these small business advisors are seen as being “able to provide knowledge resources for firms with limited access” (Łobacz, Głodek, Stawasz and Niedzielski, 2016, p. 120). The focus of this study is on those professionals whose actions are directed towards providing general business advice to small businesses as directed by the needs of their clientele. For the purposes of this paper the external advisors who are the focus of this study will be denoted as Professional Business Advisors (PBAs).

Due to resource limitations associated with business size, SMEs may seek advice from external individuals or organisations when needed (Smallbone, North and Leigh, 1993). Because small business size hinders the knowledge movement normally associated with larger corporate

environments, small businesses overcome organisational knowledge isolation by supplementing their knowledge through the use of external advisors (Gibb, 1993; Kent, Dennis and Tanton, 2003). A range of small business benefits are associated with the use of PBAs including the procurement of specialised knowledge and skills (Chrisman, McMullan and Hall, 2005; Viljamaa, 2011), access to financial information related to taxation (Holmes and Smith, 1997), operational planning and systems reviews (Carey, Simnett and Tanewski, 2005), future trends and fresh ideas (Hurmerinta-Peltomäki and Nummela, 2004), innovation strategy (Bessant and Rush, 1995), or simply as the source of valuable industry contacts (Chrisman and McMullan, 2000).

In Australia the overwhelming majority of businesses in almost every industry are classified as small, with a significant number of small businesses located in Regional (non-metropolitan) locations in each state (Nicholls and Orsmond, 2015). For many Regional economies, small businesses are regarded as the main wealth creators (Lowe and Henson, 2005), with their support for local communities being crucial to the economic and social viability of the region in which they operate (Hettihewa and Wright, 2018; Robbins and Murphy, 2005). Bearing in mind the importance of small businesses to Regional communities, any failure in helping businesses overcome their difficulties may potentially impact on the overall region's economic performance (Australian Chamber of Commerce and Industry [ACCI], 2004). This presents challenges because Australian small businesses are considered prone to high failure rates (Ahmad and Seet, 2009; Watson, 2003) and substantial annual churn (ABS, 2013). The propensity for small business churn can be exacerbated by location remoteness, the influence of resource access limitations considered a significant barrier for non-metropolitan small businesses (Henderson, 2002). Considering the comment by Hettihewa and Wright (2018, p. 114) that Regional small businesses (SBs) "tend to have attributes, behaviour, and needs that differ significantly from urban-SBs", this paper identifies that the use of Regional PBAs may address the potential knowledge isolation experienced by Regional small businesses.

Whilst seeking to understand the mechanisms that affect the provision of small business advisory services, by PBAs, in a Regional Australian setting, an emergent theme identifies government business programs and initiatives as significant conduits for regional business knowledge transmission. This finding supports the premise by Hulpke and Byrnes (1994) that governments in many countries encourage the creation and continuance of small businesses through the support of business assistance programs. Also, Holmes and Smith (1997) identify that the Australian Federal government has introduced programs intended to improve SME's efficiencies and their utilisation of PBAs through the provision of subsidised access to such advisors.

Whilst in most countries, including Australia, governments seek to address the significant resource gap in small businesses through the provision of advisory services or subsidised assistance (Sawang, Parker and Hine, 2016), this study asks how such programs and initiatives are perceived by professionals providing knowledge services, in a Regional Australian context. Do PBAs consider government business programs and initiatives as important mechanisms for knowledge transmission, and if so, how effective are such programs and initiatives in addressing Regional knowledge isolation?

The following literature review identifies key contributions that illustrate both the importance of PBA services for Regional Australian small businesses and the recognised importance of government funded programs for supporting small business economic development within those regions. This is followed in this paper by the study's methodology and findings. Coming up with an answer to the research question and its policy implications.

LITERATURE REVIEW

Bessant and Rush (1995) comment that most governments now support innovation at a Regional level in some way, however Everett and Watson (1998) identify that governments are faced with the dilemma of how to allocate funds for providing this support. Whilst Everett and Watson (1998, p. 371) comment that if the primary reason for small business failure is internal, then government policy should be targeted towards individual businesses; but if the primary reason for failure is external, then funds should be allocated towards “changing the economic environment in which small business operates”. From this perspective, government policy needs to be directed at both the individual business and the economy if the intention is to reduce the overall rate of small business failure (Everett and Watson, 1998).

Assistance provided by government for small business is usually motivated by ‘external’ economic concerns; mainly the stimulation of economic development and increased employment through improved small business operations (Breen and Bergin-Seers, 2002). Yet, a significant amount of literature is related to government policy addressing ‘internal’ small business issues, for example: Barrett, Billington and Neeson (2004) discuss the government program delivering hands-on assistance to 30 small businesses in the Latrobe Valley; Holmes and Smith (1997) identify the impact of subsidised business advice through the Australian Federal Government National Industry Extension Scheme (NIES); Sear and Agar (1996) conduct a survey of PBAs engaged in the British government developed SME information and advice service called Business Link; Robson and Bennett (2010) also investigated British government policy associated with Business Link. There are many more along these lines.

When addressing the internal small business failure issue, Peterson (1988) identifies three public policy models implemented by governments. The first is denoted as the ‘laissez-faire approach’ in which governments are not concerned with high failure rates but rather allow the process of start-up, survival, growth or decline to happen naturally. The second approach is the ‘limited-environmental policy approach’ in which government involvement is considered appropriate but should be limited to fostering a good economic climate for small business growth and development. The third is the ‘strategic interventionist approach’ in which the government is perceived as the protector and advocate of small business interests and as such needs to provide direct aid in the form of financial aid and advisory services. Along this third approach, Howard and Hine (1997) identify three forms of government small business assistance: (i) establishment of a small business advisory department which provides advisory services inclusive of market opportunities, referrals for professional services and regulatory requirements; (ii) provision of business training or financial support, for example the New Enterprise Incentive Scheme (NEIS) in Australia that provides support for unemployed who wish to start-up a business; and (iii) the business incubator which can provide subsidised rent, administrative support, business advice and other development support. PBAs can be engaged to deliver any aspect of the above three assistance (Howard and Hine, 1997).

This paper focuses on mechanisms adopted by governments in using PBAs to provide small business advisory services. In this context, Gnyawali and Fogel (1994, p. 57) suggest the main role for government small business policy is “to increase opportunities, to develop the motivation of potential entrepreneurs to go into business, and to enhance potential entrepreneurs' ability to start a business”. Further, they suggest that before policy is developed that governments need to identify “the extent of the opportunity, propensity to enterprise, and ability to enterprise” and then formulate policies that address the weakest areas (Gnyawali and Fogel, 1994, p. 58). Small business government support can be labelled in terms of being soft or hard schemes: soft schemes focus on the provision of education, business advice and business opportunity awareness; hard schemes focus on the provision of direct financial assistance

(Rotger, Gørtz and Storey, 2012). Thus, specifically governments' use of PBAs is associated with soft schemes.

The provision of government soft schemes, specifically PBA knowledge services, is dynamic and interactive, meaning the transference of knowledge is an activity that benefits from collaborative one-on-one interactions (Feldman, 1994). The importance of one-on-one interactions underscores the belief that external business advisors are an important source of information for developing small business knowledge (Chrisman, 1999; Robinson Jr, 1982). Chrisman and McMullan (2004) present evidence that PBA assistance has a causal link with small business survival, they identify that survival rates were significantly higher for businesses who received government supported business advisory services, 64%, compared with the 47% US national average of all businesses, which also includes businesses who received business advice (Chrisman and McMullan, 2004).

When investigating business consultants, Holmes and Smith (1997, p. 59) identify that consultants consider one major benefit of government supported small business programs is “that SMEs gain an understanding of the benefits of accessing consultants, and may be less reluctant to seek out the help of consultants when problems arise in the future”. Ehrich and Billett (2004) suggest that government programs aimed at helping small business learning should find ways to develop localised support for such programs. From a small business perspective, Barrett *et al.* (2004) identify that small businesses received a number of benefits when participating in a small business assistance program in the Latrobe Valley, they included gaining confidence, an increase in staff numbers, and business continuation.

Robson Shaw and Bennett (1999) identify that government support schemes with specialised objectives, tight structures, and a focus on addressing gaps in the market work better, and Storey (2000, p. 314) asserts that governments need “to do less and better, rather than more and worse” when providing services for small business development. Research has indicated that businesses want governments to create an appropriate macroeconomic environment in which businesses can succeed (Storey, 2000). This aligns with Hettihewa and Wright (2018) who claim that government policies directed towards strengthening Regional small businesses need to improve the socio-economic viability of the region.

There appears to be a global concern about governments spending public funds on small business support initiatives, this is reflected in comments by Chrisman and Katrishen (1994) who explain that the Small Business Development Center (SBDC) program in the US can be justified from a public policy perspective, when there is continuing evidence that the assistance provided through the program delivers more revenue through taxes than the operating costs of the program. However, there appears to be limited research into the policy effectiveness of programs intended to stimulate small business and entrepreneurial activities, with findings inconclusive (Mazzarol and Clark, 2016; Rigby and Ramlogan, 2013).

METHODOLOGY

This study focuses on PBAs who service small businesses operating within both inner Regional and outer Regional locations within the State of Victoria: Inner Regional describing minor accessibility limitations to services within the region (ABS, 2004a); Outer Regional describing moderate limitations to services (ABS, 2004b). The focus on both inner and outer localities is founded on the belief that Regional towns act as service hubs beyond metropolitan centres (Baum, O'Connor and Stimson, 2005; Doherty, Rissman and Browning, 2013). Such selected towns have a Regional Development Victoria office and subsequently are considered to be a central location for Regional businesses to access advisory services. The four Inner Regional

locations involved in this study are Ballarat, Bendigo, Warrnambool and Shepparton. The two Outer Regional locations in this study are Horsham and Swan Hill.

A qualitative approach was used which included two primary data collection approaches, in-depth interviews and focus groups. These conversational methods allowed the researcher to generate empirical data about the social world by asking individuals and groups to discuss their respective experiences (Holstein and Gubrium, 1997). To identify appropriate PBAs within each location, the study adopted reputational case sampling, allowing the researcher to use local small business experts in each region to identify PBAs that small businesses might be directed towards when seeking information, knowledge, or advice (Roulston, 2010). In each region, local business experts were approached to identify appropriate interview participants. These experts included individuals who worked for Regional Development Victoria (RDV), the Industry Capability Network (ICN), the Small Business Mentoring Service (SBMS), AusIndustry, the Australian Industry Group, local council economic development offices, the Ai Group, community business networks and local chambers of commerce. It should be noted that the focus group participants were selected from individuals identified as business experts in each region; some of whom, not all, had provided recommendations of appropriate interview participants.

A total of 29 face-to-face interviews were conducted across six different regions. This included five in Ballarat, five in Bendigo, five in Shepparton, five in Horsham, six in Warrnambool and three in Swan Hill. Across the six Regional Australian locations there were seven different PBA professions who participated in this research. Participants were identified as being business advisors, consultants, coaches, mentors, legal specialists, accountants, and financial counsellors. Consultants were the dominant profession contributing to this research with nine participants, followed by advisors with six participants, mentors had five, accountants four, counsellors, and coaches had two each, and there was one legal specialist.

At the completion of the individual interviews with PBAs, this study purposively selected a group of Regional Victorian small business experts to engage in focused discussion about the emergent themes. One focus group, in each of the six regions, was conducted with participants from local government economic development departments, local RDV offices, local Registered Training Organisations (RTOs) who provide business mentoring programs, local commerce associations, and other local business networks.

The data analysis of both interviews and focus groups was managed through NVivo, the Computer Assisted Qualitative Data Analysis software (CAQDAS), with participant comments coded to thematic nodes and then categorised into broader concepts. One thematic node identified all comments related to government funded small business advisory support and identified both the importance of government initiatives for small business advisory services and also a range of constraining attributes which may hinder the knowledge transmission process.

FINDINGS AND DISCUSSION

Six positive aspects of government funded support for small businesses emerged in this study: (i) the provision of funding for programs, (ii) support provided from various levels of government, (iii) the provision of crisis counselling for some businesses in financial distress, (iv) mentoring services for SMBs and start-ups, (v) skill development through business workshops, and (vi) networking opportunities. Each is set out below.

This study identified that government expenditure on small business initiatives was evident in each region included in this study, and that this money is considered important to ensure that

small businesses in Regional locations have access to needed support. The importance of this expenditure is evident in Hettihewa and Wright (2018) who suggest that government efforts to address the depopulation and decline of some regions should focus on Regional small business policy.

Support for Victorian Regional small business was identified across various levels of government, with collaboration and knowledge sharing crossing different government departments, government funded institutions, and local professional associations. This was evident in the cooperative engagement between Focus Group participants, who came from different government departments, government subsidised institutions, business networks and local business associations. This finding aligns with Barrett *et al.* (2004, p. 192) who comment that a positive aspect of a small business assistance program in the Latrobe Valley was that it reinforced strong working relationships between various levels of government and their agencies, which were evident in “communication, cooperation and coordination between agencies”.

Across all region’s crisis counselling services were provided for businesses in financial distress, these services provided through the ‘Rural Financial Counselling Service’. This service enables Regional farm-related businesses to sort through financial issues, understand their financial position, and have information required to make critical business decisions. When describing their role one participant explained that:

My role as a rural financial counsellor is not to tell people what to do, but it's effectively to sit down and help them understand where they're at financially, list options that they may have available to them, including options that we may not be aware of, and to help the client be able to make a decision as to what they want to do (HOA2).

Mentoring services for SMBs, and start-ups, was also available in all regions via the government provided ‘Small Business Bus’ and Regional members of the ‘Small Business Mentoring Service’. The Swan Hill focus group emphasised the importance of the bus to the region, stating that “When they do go, they are booked solid” (PHSH). However, they also raised concerns around the frequency of the service to more remote communities, commenting that the bus only visited Swan Hill once a year. A comment was made that “If the Small Business bus was to be a really useful resource in Regional areas, there’d be 20 of them and we’d have one in Mildura and one in Swan Hill every month” (PHSH).

All regions provided business workshops and networking opportunities for small businesses to develop skills or to expand their networks within their communities. However, the validity of these services was questioned by a few focus group participants because they considered them to be frequently poorly attended, for instance a comment from the Shepparton focus group was “workshops are always difficult to attract people to...” (MCSP). It was also noted in a few areas that smaller satellite regions had better attendance than the bigger towns, for example “Out of the five shires that we cover in the Wimmera, Horsham's probably the least proactive when we do workshops” (RHHO). Another issue of participation was that businesses that need the help tend not to use the service, this was expressed in the Horsham workshop: “we know that those small businesses who are proactive are going to the workshops. ...and they're often the ones that don't necessarily need it. Those that do need the help don't attend...” (WMHO). It was suggested that government workshops are perceived negatively and thus poor attendance is an outcome, this was reflected in a comment from the Bendigo focus group: “the perception would be that there might be more merit and value from the privately run workshop to the government run workshop, although the presenter may be the same or of a similar calibre” (PJBE).

Whilst acknowledging the positive contributions that government funded small business initiatives provide to PBA knowledge transmission across Regional areas, it was also identified

that PBAs perceived government initiatives as presenting significant constraints. These constraints are: (i) the requirement for knowledge needs to fit government mandated boxes; (ii) issues of financial viability for PBAs; (iii) the ineligibility of many regional small businesses to access government funded initiatives; (iv) the unpredictability of government programs; (v) moving allocation of funds to different Regional locations; and (vi) a clash between technology utilisation and infrastructure reliability in some non-metropolitan Regional areas. These constraints are set out below.

One constraining aspect for PBA knowledge transmission was the need to adhere to highly regulated government requirements. The PBA may have time constraints imposed on the client engagement, this could include the number of free sessions available before costs are incurred, a limited time allocated for free service, or the frequency by which these services are available in any region. PBAs may also have role constraints imposed on what services they are permitted to provide, such as terms and conditions specifying that mentors are not allowed to go beyond that role, or that counsellors are not allowed to provide advice. Additionally, travel conditions may be imposed on the PBA which directly impacts on their ability to appropriately service more remote small businesses in Regional Australia. One participant commented on how the travel reimbursement policy impacts on their ability to mentor small businesses who are more remote; "...under the way that I get reimbursed for travelling, I'm not supposed to do more than a 50k round trip. I am discouraged from doing more than 50k... I'm actually supposed to ask the client to reimburse me for travelling". This finding reflects similar comments by Barrett *et al.* (2004, p. 184) about the difficulty to provide advisory services in accordance with government program requirements, they state that "Adhering to the program budget, including travel costs and time allocated for each business, was a constraint". For some PBAs who had previously participated in government funded advisory initiatives this was a characteristic that hindered any further participation. One PBA commented that: "Government programs I generally find are - excuse the phrase - a waste of f*##ing time and money. They are run by bureaucrats who have got no concept of business and you've got to fit their boxes" (BAA4).

Barrett *et al.* (2004) describe one requirement of PBAs involved in government funded programs is to overcome small business scepticism and to recruit businesses into the program. It was noted that the process to recruit businesses took longer than anticipated because not all the businesses were either willing or able to participate. This aligned with the responses of a few PBAs in this study who commented that one constraining factor was financial. They stated that revenue from government programs did not make commercial sense for them, it required additional work to locate suitable clients and the level of remuneration was much lower than providing fee-for-service. When discussing this issue one PBA commented that: "my own view is I'd rather not rely on that for business because the type of business we get out of it's not really the business we want" (WAA6).

Another issue raised was program selection participation criteria based on business size or turnover, which designate many small businesses ineligible to access government funded initiatives. When describing a particular government program for the development of business plans, a member of the Shepparton focus group said: "...you've got to be a turnover of \$500,000 and be export focused basically so that cuts out a whole lot of those smaller..." (PCSP). Similarly, in Ballarat it was commented that: "...our business advisors, the way that the eligibility's structured is more focused at the established businesses, the ones that have traded for at least three years, have a turnover of \$1.5 million plus" (DEBA).

One significant constraining factor was the perceived unpredictability of government programs. Some PBAs commented that they could not trust government funded initiatives because the rules can change at any time. Sudden changes to programs, or initiatives, requiring PBAs to

adjust and potentially absorb the financial implications. When explaining a previous government funded drought program for regional businesses, one PBA said:

...only when each farmer had completed all four sessions that we got paid, and suddenly when we were about halfway through, the Feds said, "It's all over in three weeks. You've got to have it finished." So how it didn't kill us, I don't know. So we got out of it and after that we said, "They can stick it."

The focus groups tended to describe this issue as the changeability of government programs, rather than the unpredictability. However, it was still considered an issue, in the Bendigo focus group it was described as affecting Regional small businesses in general:

One of the things that I think frustrates small business is the politicisation and the change of government, change of name, change of program, change of processes, change of systems ...there can be no guarantee of process or systems or individuals that provide ongoing support to business, it's just an ad hoc political bloody toy for Canberra and Spring Street at the moment (GLBE).

Another aspect of PBA risk connected with the unpredictable nature of government programs, was the dynamic way funding for programs migrate from region to region, often attributed to the emergence of Regional crisis. The types of crisis discussed in this study included fire, drought and large organisational closures. A number of focus groups identified this issue and one example was:

...we've seen recently, probably over the last four or five years say with the demise of Ford a lot of emphasis both federally and state going into Geelong. So, everybody kind of dives into there, the money kind of gets thrown into those areas because they don't want to see people out of work. But then more recently you've had Hazelwood closing down so it's kind of the focus from what I can see has shifted from say Geelong out to the Latrobe Valley (ABBA).

This shifting of government funds from region to region also means that the need for PBAs to deliver knowledge-based initiatives moves, and opportunities for PBAs to transmit knowledge through government programs move. These knowledge transmission opportunities are fluid and follow the government money. Which potentially means that some Regional areas do not receive appropriate funds for small business initiatives because they are not considered a critical concern for the government.

It appears there have been policy changes shifting small business advisory services from face to face PBA knowledge transmission to self-help online systems. It was said in the Ballarat focus group that, "A lot of the smaller micro business support has moved into the more digital space and online, the free tools and templates, the information made available for people to access" (DEBA). Whilst the shifting of government small business programs into the online environment enables small businesses to access a lot of information for free, it does not ensure that small businesses know where to find that information, as was reflected in the following statement: "In most cases most businesses do not know what is available to them. It's the known unknowns. You don't know what you need until sometimes it's too late" (SBBA). This also raises the issue identified by Hettihewa and Wright (2018) that Regional small businesses are reluctant to embrace the adoption of technology in their business. The shift towards technology solutions also does not take into consideration the infrastructure issues some regions face, as raised in Swan Hill: "...the north-west of Victoria has got the worst connectivity of any region in Victoria and one of the worst in Australia. It's poor infrastructure, it's huge distances in comparison to other areas" (PHSH). Finally, the shift to impersonal online methods for knowledge transmission does not fulfil the important relational role that many PBAs believe is critical for successful knowledge transference to occur.

CONCLUSION AND IMPLICATIONS FOR POLICY DEVELOPMENT

Regional Australian PBAs service a heterogeneous collection of businesses across large geographic areas. Yet, the potential influence that these PBAs have in the process of knowledge transmission is severely constrained by current government programs aimed both at start-up Regional businesses and those pursuing organisational growth. Such constraints as set out in this paper raise concerns that have Regional policy implications.

From the positive attributes of appropriate government expenditure on small business support programs, such programs are perceived as valuable within Regional communities and that ongoing expenditure should be encouraged. However, governments need to address the constraining aspects identified in this paper. Notably, unpredictability of government programs, moving allocation of funds to different Regional locations reflecting political swings, shift away from face-to-face small business programs to self-help online systems, and subsequent issues of financial viability for PBAs. Government policy needs to address these issues, otherwise what emerges from this paper is significant reluctance by PBAs to engage with such programs. This will result in reducing greatly the pool of knowledge that can be accessed for its transmission to small businesses in Regional locations, making such programs less effective because of the resulting knowledge deficit from the missing PBAs.

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The Use of Value Capture in Co-funding Inland Rail: Lessons from MTRC in Hong Kong and Mainland China

Vince Mangioni

University of Technology Sydney, Australia

Vincent.Mangioni@uts.edu.au

ABSTRACT

The idea of high speed and inland rail options across expanses of nations is not new, however what remains elusive is the funding required to operationalise this idea. With roads remaining the primary conduit for logistical distribution, the idea of rail as an alternate mode of long distance travel by road and air has been embraced in several Asian and European nations. This paper looks at the model used by the Mass Transit Rail Corporation in Hong Kong and Mainland China for funding rail as a means of achieving two objectives. The firstly objective is connecting cities with each other and secondly connecting regions and cities as a means of logistical freight distribution. While consolidated revenue remains the primary source for funding these projects, the use of value capture is now being employed in the cities and regions of China to fund this initiative. Using Hong Kong and Mainland China a case study, a framework is developed for funding rail development for freight distribution using value capture in Australia.

INTRODUCTION

The prospect of strengthening the economic status of regional Australia through the development of transport links to main cities, as well as the development of an inland freight rail network are project opportunities that mutually benefit regional and urban Australia. The Regional Australia Institute (2016, p. 8) highlights the loose definition of what constitutes regional Australia in stating;

The RAI uses 50,000 people as the threshold for regional cities that deliver 31 distinct small cities across Australia. While any threshold is imperfect, this level of population is important to both the economic diversity of the city and to the potential for agglomeration economies becoming the key driver of economic development.

It is further highlighted that for a country looking at population growth to 40 million in the next 50 years, that small cities form a growing and increasingly connected network of urban areas. These areas stretch from Cairns in the north to Hobart in the south, Darwin along with Mandurah and Bunbury south of Perth complete the national network (ibid). In developing cities and their surrounding regions economically, transport infrastructure is a key factor in addressing the economic stimulus of these regions.

In Australia we look at the proposed Inland rail project that commences with several objectives that include regional development and sustainability as key objectives. The Australian Track Rail Corporation (2015, p. 8) defines the two key challenges confronting regional economic

growth and productivity resulting from road congestion in the development of alternate fast rail options along the east coast of Australia as:

Current north–south freight infrastructure (road and rail) is constrained and this will increasingly impact negatively on broader transport network performance and freight productivity. The Melbourne to Brisbane intercapital freight task is currently dominated by road comprising an estimated 100 000 truck trips per annum. In contrast, rail transport provides the opportunity to remove 161 trucks for every train between Melbourne and Brisbane, and to minimise network congestion.

Under the proposed development of the North South freight infrastructure initiative, greater access between producers, markets and ports stand to significantly improve the regional development and prosperity through greater market efficiencies. This is achieved as the rail route between Brisbane and Melbourne moves inland with stops at major distribution hubs located in Toowoomba, Inglewood, North Star, Moree, Narrabri, Narromine, Parkes, Stockinbingal, Wagga Wagga, Albury and Seymour. The key objectives of this development in providing greater market efficiencies (ibid, p. 8).

Existing north–south freight infrastructure is impacting regional producers and industries access to efficient supply chain networks, inhibiting productivity and economic growth. The east coast regional rail network, in its current state, reflects a legacy of poor alignments and inadequate investment, limited capacity and low productivity, rather than a purpose built highly productive rail freight network.

The activity around regional logistic distribution hubs provides significant growth in surrounding property values that will service new industries that evolve from regional growth and activity. In recent times the increase in surrounding land values resulting from infrastructure has been captured and recycled as a form of funding or partial funding of projects that generate the increase in value. This concept is known as ‘Value Capture’ funding which is defined by Smolka (2013, p. 8) as;

the recovery by the public of the land value increments (unearned income or *plusvalias*) generated by actions other than the landowner’s direct investments

This concept is adapted from the Hong Kong to Mainland China case study in defining how funding may be raised from the Inland rail project underway in regional Australia.

LOGISTICS AND FUNDING OF THE INLAND RAIL PROJECT

Project Logistics

The conceptual development of the Inland rail project stems from the initial points raised in the introduction, of which these evolving impacts are anticipated to be overcome using strategic infrastructure development that links regional towns and major cities. The Australian Track Rail Corporation (2015, p. 10) more specifically sets out the key benefits of the Inland Rail Programme to the freight industry, environment and broader community as follows:

- Improved linkages within the national freight network: Enhances the National Land Transport Network by creating a rail linkage between Parkes in New South Wales and Brisbane, providing a connection between Queensland and the southern and western States.
- Improved access to and from regional markets: Two million tonnes of agricultural freight attracted from road, with a total of 8.9 million tonnes of agricultural freight carried on Inland Rail. Reduced costs for the market: Reduces rail costs for intercapital freight travelling between Melbourne and Brisbane by \$10 per tonne.
- Improved reliability and certainty of transit time: Less than 24 hour rail transit time between terminals in Melbourne and Brisbane and reliability matching current road

levels. Increased capacity of the transport network: Additional rail paths for freight (160 round trip paths per week) a 105 per cent increase on current freight paths on the coastal route alone, along with releasing capacity for passenger services in Sydney and Brisbane, and removing 200 000 truck movements from roads each year.

- Reduced distances travelled: 200 kilometre reduction in rail distance between Melbourne and Brisbane, and 500 kilometre reduction between both Brisbane and Perth and Brisbane and Adelaide.
- Improved road safety: 15 fewer serious crashes each year avoiding fatalities and serious injuries.
- Improved sustainability and amenity for the community: More than 750 000 fewer tonnes of carbon and reduced truck volumes in over 20 regional towns.

The extent of reform results in the transition in transport market share in 2013-14 from 74% road and 26% rail, to 62% rail and 38% road by 2049-50 is a key outcome of this project (PwC 2015). While the above benefits are important, the cost of improvement and economic efficiency must be justified in the allocation of government funding of large scale megaprojects. The Commonwealth of Australia (2010) in conjunction with the Australasian Railway Association set out the key benchmarks to be addressed in the development of a national inland railway strategy. These benchmarks have evolved over the past decade in Australia in line with international best practice and capacities required of anticipated population growth.

Table 1: Comparative Review of Initial and Revised Logistics

Logistical Development	2008	2025
Train Lengths (Freight)	1300 to 1500 m	3500 m (up to)
Track Length (Nth/Sth line)	1200 km	1700 km plus upgrades
Capacity	Single stack container	Double stack container
Speed (Ave)	68 kph	110 kph
Melbourne to Brisbane	Over 36 hrs / 89% reliability	Under 24 hrs / 98% reliability
Maximum Crossing Time	15 minutes	20 minutes
Median Dwell Time	20.9% of total journey time	Less than 10% of journey time

Sources: Commonwealth of Australia (2015) and ATRC (2010).

Funding Infrastructure Projects

The Inland Rail Project is one of the largest rail developments in Australia with the estimated cost standing at AUD\$9.7bn. Of this sum approximately 65 percent will be funded from revenues generated from the project itself (ibid) with additional revenues required to fully fund this project yet to be determined. It is at this point that the concept of value capture is considered as one of the approaches to be embraced in contributing to the development of this project. The principle of value capture is particularly relevant in times of rapid urbanisation where such uplift in value is generated by indirect causal changes in value resulting from increased demand in population growth alone. Such causes might be defined as intangible as they impact value resulting from policy change that increases demand for land without any physical change such as a service or piece of infrastructure.

In other cases as per the Inland rail project, these value uplifts are generated by tangible infrastructure projects which as a secondary result generate population growth and further add to demands for land prompted by population growth and job generation. Connolly and Wall (2016, p. 161) support this idea by stating, “Improvements in transit increase accessibility to jobs and schools, and easily accessible locations tend to command higher prices.”

Traditionally in Australia existing recurrent land value taxation approaches such as state land tax and local government rating are used to capture these more subtle rationales for increases in values (Mangioni, 2016). In contrast, value capture is more penitently employed by governments where a specific project or service is employed and the potential for revenue from increases in values directly attributed to that service might be earmarked to fund either the project itself or similar projects that are proposed. Zhao and Larson (2011, p. 320) define Value Capture aligning with the Benefits Principle in which infrastructure improvements are used to fund and pay for such improvements. Smolka (2013) further adds that local authorities in Latin America find greater flexibility in approaches that are applied on a project by project in contrast to those applied using broad city wide fiscal instruments.

The use of value capture in the broadest sense, referred to as valorisation by Reyes (1980) has been applied to roads and bridges and can be traced back to the 1500s in Spain and Portugal and 1600s in Mexico. Its application is via a fee paid by all owners of land that benefit from the works, also referred to as a betterment levy in England as an impost used to fund the development of canals along the Lea and Thames rivers in the 1800s. The use of value capture was used in Sydney Australia in the 1920s and 30s to assist funding the construction costs of the Sydney Harbour Bridge. Commonwealth of Australia (2016) highlights the impost of 0.2 per cent on the unimproved capital value of all land in the Sydney Basin for approximately 15 years used to partially fund one of Australia’s most iconic and necessary infrastructure projects. While a temporal void exists in the use of value capture for some time, (Zhang and Xu, 2017, p. 2) states that value capture as a funding tool has made a significant resurgence over the recent few decades in developed and developing countries.

In contrast to the betterment or levy impost option we look at an additional option which may also be embraced as an option in conjunction with other options discussed. In Hong Kong a very successful rail funding value capture approach has developed over the past 17 years that has been used to fund and projects, return a social dividend to government and remove the need for revenue to be input from consolidated revenue of central government. In illuminated how this approach applies and then how it may be adopted in Australia, we commence with an overview of the development of the entity used to raise this revenue source followed by the value capture mechanisms applied in the next section of the paper under the research methodology section. On the matter of the diversity of value capture mechanisms, Gielen *et al.* (2017, pp. 126-127) define the mechanisms as being direct and indirect instruments, negotiable and non-negotiable developer obligations, private and public land assembly and land development embedded approaches.

The Hong Kong Mass Transit Railway Corporation MTRC was established on 22 September 1972 as a government-owned statutory corporation to build and operate a mass transit railway system to meet Hong Kong's public transport needs. On 30 June 2000 the MTRC was succeeded by the MTR Corporation Limited As with the MTRC, the MTRCL's principal business is to operate the mass transit railway system. Following a successful initial public offering, the MTRCL was listed on the Hong Kong Stock Exchange on 5 October 2000, however the government was still the major stakeholder in the MTRCL. On 11 September 2000, the Financial Secretary of the Hong Kong Government, Mr Donald Tsang, announced the partial privatisation of MTR Corporation Limited. The offering was for one billion shares, but

this was increased to 1.15 billion due to high demand. On 5 October 2000, the company was listed on the Hong Kong Stock Exchange with 600,000 shareholders. In June 2001, MTR was added to the Hang Seng Index. There had been some discussion of merging the Kowloon-Canton Railway Corporation (KCRC), which was also government-owned, and the MTR to make the territory's transport system more efficient.

On 11 April 2006, the Hong Kong Government officially announced the details of the proposed merger. Under the non-binding Memorandum of Understanding the Government has signed with KCRC, KCRC would grant a Service Concession to the MTRCL to operate the Kowloon-Canton Railway (KCR) system, with an initial period of 50 years. The KCRC would receive a one-time upfront payment of HK\$4.25 billion, a fixed annual payment of HK\$750 million and a variable annual payment based on revenues generated from operation of the KCR system. In addition, MTRCL would make a payment of \$7.79 billion for the acquisition of property and other related commercial interests.^[5]The railway lines the KCRC operated were less profitable than the MTRC, and the KCRC was less active in property development. It was widely considered that the Government's choice was to avoid being criticised for selling assets of the KCRC, which it wholly owned to MTRCL at an underpriced level. Leasing the operation right of the KCR system to the MTRCL could avoid actually selling the KCRC.

MTR operates a network of 9 railway lines in Hong Kong, carrying an average of 4.9 million passengers every weekday. Building on its success in Hong Kong, the Corporation has a vision to expand into the Mainland of China and the international market. To date, MTR has railway investment projects in Beijing, Hangzhou and Shenzhen, as well as franchise operations in London, Stockholm and Melbourne. To achieve this overseas growth vision, business model innovations are often required so as to satisfy the needs of governments and different stakeholders. In August 2011, MTR won a bid for a property development site at the Shenzhen Longhua Metro Line Depot with a total developable gross floor area of 206,167 square metres. This is a first-of-its-kind project, successfully modifying the rail plus property development business model in Hong Kong to suit the local context with part of the net proceeds being returned to government.

RESEARCH APPROACH AND METHODOLOGY

In undertaking research into how revenue shortfalls required to fund the Australian Inland Rail project a desktop review of recent international large scale projects was under taken. Rail projects in Japan, Scandinavia, Singapore, China and Canada were reviewed and considered, with the decision for the case study being the Hong Kong and mainland China MTRC project. The reasoning for this decision is twofold, the first being the business model used in Hong Kong which has an integrated rail and property model, of which fund can be clearly defined resulting from measurable uplift in value of surrounding development. This innovative model is founded on the principle of sharing in 'value uplift' derived from the change in value of land or airspace rights above or around railway line stations that benefit from the infrastructure.

The second reason for selection of the MTRC model is its adoption as a world renowned exemplar for funding largescale rail projects from uplift in value used to subsidies, or partially subsidies revenue shortfalls of largescale project. In winning the International Business Model Award in 2013 by the International Association of Public Infrastructure, a summary of this funding design success for the MTRC project in Shenzhen mainland China is defined as (International Association of Public Transport, 2013, p. 3):

The rail plus property development business model has been successfully implemented in Hong Kong as a means to internalise the added external economic benefits along the railway corridor for subsidising railway construction and operations. The business model has substantially relieved

the burden on the government and released more public funds for other social welfare uses. Under this business model, the property development rights of some stations or depot-associated sites are bundled with the railway project. With the development profit generated from these developments, the return of the railway project is able to increase to a commercially viable level.

In developing insight into the use of the Hong Kong Railway / Property Model, the researcher visited Hong Kong in October 2018 and was hosted by the MTR Corporation in undertaking several interviews and presentations that spanned two days, a schedule is provided as an annexure to this paper. In preparation for this visit, the researcher and MTR Corporation developed the key strategic plan of areas that included information on the strategic funding model, revenue sources in which meeting and interviews with each of the revenue department was undertaken. Finally, meetings with the property management and development division of MTR Corporation provided insights into the details of both recurrent and capital cash flows of their rail and property business model. The primary and overarching objectives of the meetings and interviews include the follows points that relate to this paper:

1. Is there a Rail and Property Model that is used to fund the development of railway infrastructure and if so how was this model developed?
2. How would a rail/property model apply in the development of metropolitan and broader regional rail infrastructure funding?

Table 2: Summary of Feedback on the Primary Points Addressed

Questions	Interviewees	Summary of feedback
1. How was the MTRC model developed?	Mr Felix Ng & Mr Kelson Chan	The consent arm of government removes any planning risk through the predevelopment of a precinct master plan that provides certainty for the development that is built around the infrastructure project. The developer has certainty and their developer profit split provides a return on capital investment to MTRC that is partly paid as a dividend to shareholders on the Hong Kong Stock Exchange and a profit share is paid to government as a return for the right to develop. The MTRC capital value is 25% private of which that component is floated on the stock exchange. The 75% ownership is retained by government which takes a profit margin of the same proportion. The MTRC also collects the station retail rents or industrial depot rents depending on the type of development that surrounds the railway station development.
2. How does the MTR Model apply in metropolitan & regional rail funding?	Mr Eddies Chow & Ms Gloria Yip	Market feasibility studies on a case by case basis are determined with a base line developed for the infrastructure the cost of infrastructure and gross developable plan determined. Civil development companies will tender for the construction works of the infrastructure. Private development companies with tender for retail/commercial/residential development component. A standard land premium rate per dwelling is paid to the government for the right to develop and a profit share arrangement is offered to the MTRC by the developer. The tender is determined on the profit share split which commands the most efficient form of development in line with demand for the land use in the market place.

Source: See Annexure 1.

These questions assist in defining a conceptual framework of how can the MTR Corporation Rail and Property Model may be adapted in co-funding the development of the Inland Rail in Australia. The MTR Business Model comprises a multipurpose rail and property construct where the uplift in value derived from the provision of rail infrastructure enhances the value of the land and airspace rights above and around that station. The MTR Corporation creates development rights for either residential, retail or industrial use land around their stations, of which the right to undertake part of that development is sold off to developers who pay a premium to the MTR Corp for the right to undertake that development as well as a fixed price either \$per m² of gross building area for office or industrial use land or \$per unit in the case of residential development. The MTR Corporation retains the station retail space in and around the station and collects the rent generated from this space.

Figures 1 to 3: West Kowloon Rail Terminus to Shenzhen Longhua Depot (Mainland) China Project



Figures 1-3 set out the rail lines from West Kowloon Station to Shenzhen, a historic location plan of the West Kowloon Terminus plan and finally the Shenzhen Longhua Metro Line Depot with surrounding high density residential development.

APPLYING INLAND RAIL REVENUE MODEL TO PARKES NSW

Parkes is selected as an example of how it may benefit and contribute as a location in which value capture may be applied in funding the development of Australian Inland Rail. It is a defined as major distribution hub of regional New South Wales, Parkes is one of the major stops of the Inland Rail project between Brisbane and Melbourne. Once fully operational, Pacific National's Parkes Logistics Terminal will have the capacity to process approximately 450,000 cargo containers each year, including the ability to haul double-stacked containers from Parkes to Perth.

Pacific National's initial \$35 million investment includes \$18 million to start developing the terminal site and \$17 million to acquire 'rolling stock' like freight wagons. Construction of Parkes Logistics Terminal will generate 50 full time jobs, while the future terminal will provide up to 20 new skilled jobs including train drivers and terminal crew. Mr Dalla Valle said Pacific National is committed to working closely with federal, state and local governments to enhance the efficiency of moving goods and commodities by rail across Australia. "Moving freight by rail is safer, more efficient and better for the environment – it also helps to provide secure, long term jobs; particularly in regional towns like Parkes," said Mr Dalla Valle (Parkes City Council, 2017).

With a steady population over the past decade, the 2017 population of Parkes is 14,906, it has employed residents of 6,547 with the major source of employment being health care, forestry and social assistance, with construction fast emerging as a growth industry (Parkes Local Government, 2017). The employment prospects from the Inland rail has been boosted employment in the Parkes region with increased rail track work and clearance program underway to accommodate double stacker containers between Parkes and Crystal Brook (Commonwealth of Australia, 2006). In addition to increased freight between Brisbane and Melbourne, Parkes NSW will become a major juncture for freight to and from Adelaide and Perth over the next four decades and beyond (ibid).

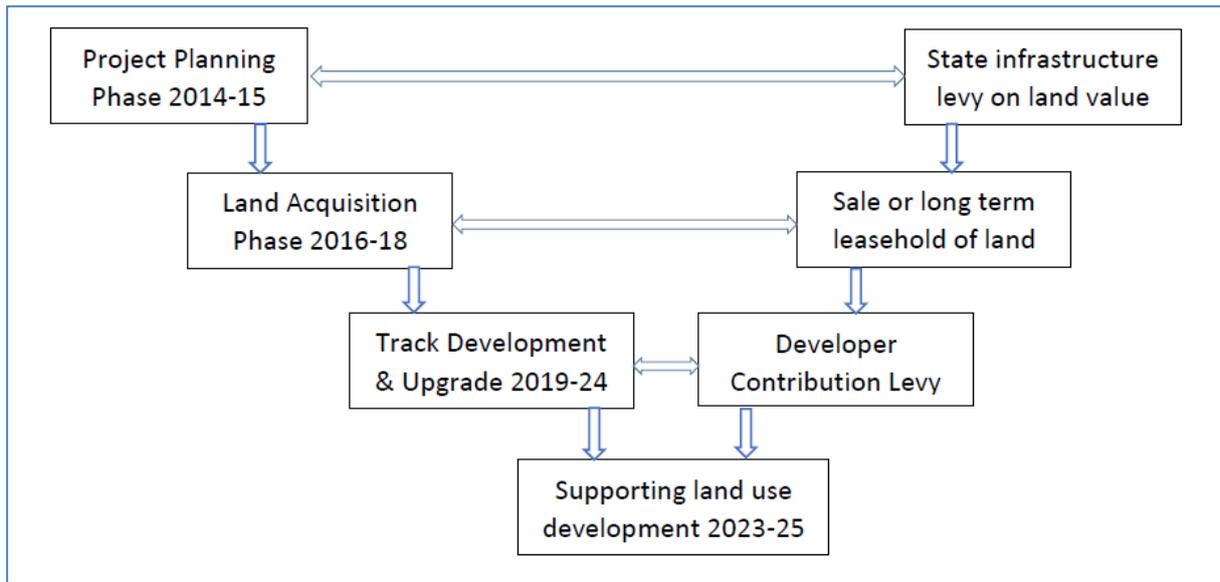
In defining how value capture may be applied in contributing to the revenue shortfalls, we have commenced by reviewing changes in land values within the Parkes local government area, in monitoring changes in value compared with immediate surrounding areas. The total land value for the Central West region increased over the 12 month period to 1 July 2017 rose by 14.8% from \$13.9 billion to \$15.9 billion. The greatest increase was in rural land values, which increased strongly by 18.4% due to good seasonal conditions and high prices for livestock and wool. Exceptions to this trend were in the local government areas of Parkes where rural land values increased moderately by 7.9% and Forbes which only showed a slight increase of 3.4% (NSW Valuer-Generals Office, 2017). A contributing factor that has impacted the value of land has been the demand and acquisition of land in the Parkes and surrounding locations for the Inland Rail infrastructure project.

The complexity of administering value capture in practise has meant that it has not been used in Australia in recent decades. Value capture mechanisms also tend to raise only a small portion of project funding costs (Productivity Commission, 2017). In international cases including the London Cross Rail, Value Capture in its various forms is anticipated to raise approximately 30 per cent of the project cost. As highlighted earlier in this paper, value capture in London have primarily been raised through the use a Mayor Community Infrastructure Levy collected as a fixed amount per area of new construction. In contrast, the new line between Hong Kong and

Shenzen in mainland China, is funded using developable property rights created by the new rail infrastructure.

In building options for funding the Inland Rail using Parkes New South Wales as an example, the increased demand for development to accommodate the logistical distribution hub would make some contribution to funding the revenue shortfall. This would of course be applied across all towns that were similarly used along the Inland Rail Route as stops and distribution hubs. In contrast to a rail / retail / residential model, an alternative for rail freight land uses would embrace a rail / retail / industrial model. In demonstrating this option in the case of Parkes, Figure 4 sets out the possible approach that may be considered in capturing a component of the value uplift in which a number of mechanisms are applied.

Figure 4: Project Delivery and Value Capture Funding Framework



The first mechanism shown in Figure 4, is a state based infrastructure levy that would apply to property within a defined location of the proposed hub that contributes to the increase in value above the ordinary organic growth rate. This impost may be imposed as an additional levy collected by local government through their rating system. The second source of revenue is derived through the sale or lease of longer term land holdings to the private sector that run similar to the model reviewed in Hong Kong and the Shenzhen Longhua Depot (Mainland) China Project. The third options is the impost of a developer levy similar to a developer contribution, which in the case of the MTRC Model is equivalent to the payment of the right to develop levy paid to government.

It is acknowledged that there is no one absolute approach to funding infrastructure in any one jurisdiction. What is relevant, is that Australia and many of its regional neighbours including New Zealand, China and India are embracing the concept of value capture in various forms as a means of co-funding major infrastructure projects. The primary objectives are to remove some of the burden from the commitment of central government from consolidated revenue and to better align the contribution, or part thereof, with beneficiary stakeholders of these projects. The example used in the MTRC case study defines that value capture is a viable option and that adaptations will be needed to phasing-in this funding concept. The fact that large scale projects contribute to building the local economies of regions as well as cities, paves the way for a business model that contributes to such initiatives that are co-funded from the project itself.

CONCLUSION

The demand for infrastructure in the advent of rapid urbanisation may be funded from a number of different sources, with more innovative options evolving that remove pressure on revenues generated from consolidated revenue. Similarly, rapid urbanisation has a number of diverse consequences that may advantageously impact regional and some rural locations through infrastructure that passes through these locations and for logistical distribution hubs. In the case of regional Australia the Inland national rail project is a good example of which the logistical distributional hub of Parkes in New South Wales provides a good example. This project will yield similar economic results across the various intersections and distributional hubs across Australia. The options for the mix of funding such large scale projects may be spread across several sources that include value capture options. While there is no one option that solely provides the optimum source of funding, the use of value capture in its various forms is among one of these options that is fast evolving internationally.

The opportunity to learn from and cautiously apply some of the evolving value capture options to largescale projects exists. Government will need to work across their various tiers in Australia in the adoption and implementation of these funding options. The scale and temporal dimensions of projects like the Inland Rail span decades in the planning and development phases. They projects provide ample opportunity for government to work with the various stakeholders in developing hypothecated funding options in contributing to projects that generate land profit sharing which has been demonstrated in the case of Hong Kong and mainland China. In Australia, the role-out of major infrastructure that links regional Australia with the cities through transportation and logistical distribution provides economic benefit to regions. In return, regions may also financially contribute to providing these projects through dividends to the community via the funding options that share the profits from land based profits.

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ANNEXURE

2018 MTR Corporation Meeting Interview and Presentation Schedule

Program / Activity	Venue	Presenter / Interview
Day 1 – 4 Oct 2018		
(Head of Operations Strategic Business Management)	Telford Plaza MTR HQ	Greeting by Siman Tang
Overview of MTR Business	Telford Plaza MTR HQ	Felix Ng (Senior Manager – Operations Development)
Introduction of Light Rail Operations in HK	Telford Plaza MTR HQ	Kevin Kiang (Operations Manager-LR & Bus)
Break		
Introduction of Mainland China & International Business in MTR	Telford Plaza	Kelson Chan (Strategy & Planning Manager)
Lunch		
Introduction of MTR Malls portfolio and latest Mall Development	Telford Plaza	Annie Sin [Chief Shopping Center (East) & Communications Mgr]
Travel to Kowloon Station - Elements		
Visit at Elements (Shopping Mall located at Kowloon Station, Tung Chung Line and West Kowloon Terminus)	Elements Shopping Centre	Vivian Lee (Chief Marketing Manager)
Day 2 – 5 Oct 2018		
Financial Management in MTR HK	Telford Plaza	Eddie Chow Manager of Finance
Lunch		
Introduction of Station Commercial Business in MTR HK (Advertising & Telecommunication Revenue)	Telford Plaza	Judy Fung (Sr. Manager - Media & Business Development)
Introduction of Station Commercial Business in MTR HK (Station Retail)	Telford Plaza	Gloria Yip (Comm & Dev Mgr- Station Retail)
Travel from Kowloon Bay to Hong Kong Station		
Site Visit of Station Retail Business (Hong Kong Station) Assembly location: TBC	Hong Kong Station	Mr Aaron Lam, Manager - Station Retail,
End		

Using Road Freight Movements Survey Data to Estimate Road Freight Transport Quotients and Regional Road Freight Flows in Australia

Cliff Naudé

Exponential Economics, Australia

cliffnaude@exponentialeconomics.com.au

ABSTRACT

Australia comprises states of varying climates, natural resource endowments, geographic area and population size. This has resulted in a diversity of regional or state economies, regional road freight flows and road networks to serve these needs. In this paper, the concept of location quotients is first examined in terms of its theoretical basis. It is then applied to Australian Bureau of Statistics 2014 Australian Road Freight Movements survey data to calculate “road freight transport” quotients across states in Australia in terms of tonnes and tonne-km, by state of origin-destination and for different commodity types. Origin and destination flows are then compared to determine the extent to which the different states are “outward-orientated” in terms of direction of flows and in what types of goods. Finally, the paper also explores implications of the study for policy analysis as well as future uses of the data, taking account of issues regarding the reliability of the survey data.

1. INTRODUCTION

The Australian Bureau of Statistics (ABS) released the results of the 2014 Australian Road Freight Movements survey (ABS, 2015) in October 2015. This was the first such survey of national road freight movements in Australia since the 2001 Freight Movements survey (ABS, 2002). The 2014 survey data provide an overview of the distribution of regional and interregional road freight flows across states in Australia in terms of tonnes and tonne-km by origin and destination of different goods types. Meanwhile, the concept of location quotients is well known in regional analysis, usually calculated using population or employment data, to indicate areas of regional advantage or potential sectoral expansion. The objective of this paper is to apply the concept of location quotients to the 2014 Road Freight Movements survey data for Australia and develop a set of road freight transport quotients across states and commodity types.

The paper first reviews the concept of location quotients. It then examines how estimates of regional freight magnitudes and flows have been undertaken in Australia and whether the concept of location quotients has been applied to interregional freight flow data internationally. The paper next provides an overview of the approach used in the 2014 Road Freight Movements survey and data produced across states and commodity types. The paper then presents the methodology used and “road freight transport” quotients calculated across Australian states for different commodity types. The relative size of origin and destination flows is also examined

to determine the extent to which states are ‘outward-orientated’ and in what commodities. Finally, the paper also explores implications of the study for policy analysis as well as future uses of the data.

2. LITERATURE REVIEW

2.1 Location Quotients

The location quotient (LQ) is a basic metric for regional analysis, usually based on variables such as population or employment, that can be used to differentiate between geographical areas. Despite featuring so extensively in regional analysis, the theoretical foundation of the concept is surprisingly difficult to pin down. There seems to be some consensus that it originated in the 1920s with Robert Murray Haig of Columbia University and stems from his work on Economic Base theory (New York State, 2017). This holds that a region’s economy comprises *basic* sectors whose output exceeds local (regional) demand and therefore export their output to other regions (or internationally), and *non-basic* sectors whose output is insufficient for local use and needs to be supplemented by imports from other regions (or internationally). Growth of the region’s economy is attained from the earnings of the (exporting) basic sector stimulating demand in the regional economy through a conventional multiplier effect. The rationale for location quotients is the identification of these *basic* sectors of the regional economy, i.e. those sectors with a disproportionately larger role in the regional economy than in the country as a whole.

The general form of the location quotient calculation (based on employment data in this case) is set out in Isard *et al.* (1998), see Equation 1:

$$\frac{E_i^j/E^j}{E_i/E} \quad (1)$$

Where:

E_i^j = Employment in activity i in region j

E^j = Total employment in region j

E_i = Employment in activity i in the country as a whole

E = Total employment in the country as a whole.

The form of the location quotient set out above provides the basis for the development of road freight transport quotients using the Road Freight Movements survey 2014 data.

2.2 Regional Analysis of Freight in Australia

Freight flows by major economic sectors in Australia have traditionally been estimated by the Bureau of Infrastructure, Transport and Regional Economics (BITRE), previously Bureau of Transport and Regional Economics (see BTRE, 2006), with modelling undertaken within the framework of the FreightSIM model. The approach underlying FreightSIM has been concerned with interregional freight transportation across Australia by commodity type and mode (road & rail), for both bulk and non-bulk freight.

The 2001 Freight Movements survey 2001 (ABS, 2002) did, however, provide a detailed picture of regional road freight flows using articulated vehicles, in addition to other modes. Since 2001, revised estimates of the road freight task by state for Australia were undertaken by BITRE (2010) in terms of its components (interstate, capital city & rest of state). However, the completion of the 2014 Road Freight Movements survey (ABS, 2015) enabled BITRE (2016) to update estimates of the road freight task using the BITRE (2010) methodology.

Wang (2012) used commodity flow surveys and input output (IO) coefficients to estimate regional freight flows in Australia. Freight production and attraction measures were derived from industry value added and employment data by sector, as well as by household and business consumption respectively. Sources of such data included Commodity Flow Surveys and The Enormous Regional Model (TERM) IO model comprising 144 sectors and 57 regions. A key component of the study was the conversion of values to tonnages and assignment to vehicle types. National Transport Commission (NTC, 2016) summarised the 2014 Road Freight Movements survey (ABS, 2015) data as an input to its “*Who Moves What Where*” representation of current passenger and freight transportation data in Australia, but did not use it to present detailed data by commodity type.

Prior to the release of the full results of the 2014 Road Freight Movements survey (ABS, 2015), Mitchell and Kurniawan (2015) undertook an estimation of freight flows for major commodities in Australia using a linear programming approach based on public domain R software. The approach broadly involved “estimates of freight flows by modelling commodity movements between sources of supply (e.g. mines, farms, quarries) and intermediate production facilities (e.g. mills, refineries) to points of final demand (e.g. ports, for commodity exports, power stations, domestic manufacturing plants) across domestic transport networks” (Mitchell & Kurniawan, 2015). Linear programming was then used to allocate commodity movements to minimise an objective function, i.e. total transport costs. The methodology was applied to iron ore as an example and identified as potentially applicable to other primary commodities such as coal, grains, cotton, rice and sugar.

The estimates undertaken in BITRE (2016) used the 2001 Freight Movements survey (ABS, 2002) and 2014 Road Freight Movements survey (ABS, 2015) to adjust the Survey of Motor Vehicle Use (SMVU) ‘interstate¹’ road freight task in tonne-km to provide an origin-destination framework for the data. The estimates of road freight task by state estimated by BITRE are presented in Table 1.

Table 1: BITRE Estimated Road Freight Task in Billion Tonne-Km as at 2014 by State

State	Interstate			Sub-Total	Capital city	Rest of state	Total
	From	To	Through				
New South Wales	13.05	12.46	6.23	31.75	12.39	19.41	63.54
Victoria	7.69	7.14	0.48	15.31	12.43	10.85	38.60
Queensland	2.46	2.43	0.00	4.89	9.23	25.05	39.17
South Australia	2.62	2.22	0.64	5.49	3.00	4.72	13.20
Western Australia	1.00	0.96	0.00	1.95	6.73	36.68	45.36
Tasmania	0.00	0.00	0.00	0.00	0.43	2.72	3.15
Northern Territory	0.57	1.00	0.00	1.57	0.30	0.46	2.32
ACT	0.01	0.04	0.00	0.04	0.33	0.00	0.38
Total Australia	27.40	26.25	7.35	61.00	44.84	99.89	205.72

Source: BITRE (2016).

Table 1 shows the prominence of NSW in terms of tonne-km (64 billion tonne-km), with a substantial portion of it comprising ‘interstate’ traffic (almost 50%) and ‘rest of state’ (30%).

¹ Where the interstate road freight task is defined by ABS as tonne-kilometres performed by trucks registered in other states on a state’s roads.

While Victoria and Queensland were estimated to have similar magnitudes of road freight tasks (39 billion tonne-km), Victoria had a larger portion of it designated as interstate (40% versus 13%) and Queensland had a much higher portion designated as ‘rest of state’ (64% versus 28%). Owing to the longer distances involved in the state and its relative remoteness, it was estimated that 81% of Western Australia’s road freight tasks derived from ‘rest of state’, with much lower ‘interstate’ estimates.

2.3 International Experience

Commodity based Input Output (IO) tables have been used to estimate commodity flows based on economic activities for the Freight Analysis Framework (FAF) as stated in Transportation Research Board (TRB, 2010), with allocation to truck assignments or freight trips using data on average payloads. These and other methods such as multimodal network and logistics models used to deal with route assignment are reviewed in detail in TRB (*ibid*). These approaches were also reviewed in TRB (2008) on a statewide level specifically, addressing the gap in freight origin-destination data in the U.S. and providing a toolkit for the estimation of freight flows to forecast origin-destination of freight movements within cities and between regions. This approach involves estimation of interregional freight movements with commodity flow (tonnage) data derived from an IO table, converted to county-level truck assignments using a \$/tonne conversion factor and subsequently allocated to zones using location quotients derived from employment data. Estimation of interregional IO tables using a (modified) location quotient approach is explained in Hewings and Oosterhaven (2014). However, location quotients are used to allocate or distribute interregional IO activities (including supply and use tables), not freight flows. This is attributed by Hewings and Oosterhaven (*Ibid*) to the absence of “intra-national, interregional trade data” in all but a few countries, e.g. Japan, the U.S. and some European countries.

The University of Minnesota’s National Freight Economy Atlas (see <http://freighteconomyatlas.org>) stands out from other sources as it uses 2012 Bureau of Transportation Statistics Commodity Flow Survey data², across the U.S. to calculate *location quotients* for rail freight and road freight on a national as well as a state level. These are defined as the proportion of commodities (e.g. agricultural goods) from a particular state transported by road / rail compared to the national average, or the proportion of commodities from a particular sub-region compared to the state average. This overall approach of freight quotients is the closest to the objectives of this paper and provides some confirmation of the methodology required for development of road freight quotients for Australia.

3. DATA

The 2001 Freight Movements survey for 2001 (ABS, 2002) encompassed air, sea, rail and road freight movements. The road freight component focussed on articulated vehicles only and employed different sampling techniques, so is not directly compatible with the 2014 Road Freight Movements survey (ABS, 2015). However, the latter involved estimates of road freight tonnes and tonne-km for an extensive list of commodity types produced by primary and secondary sectors transported by rigid trucks exceeding 3.5 tonnes gross vehicle mass (GVM) *and* articulated trucks. Given the extensive list of freight types and statistical areas, and the reliance on varied inputs from road freight transport operators, the survey results exhibited variations in relative standard error (RSE)³ identified in ABS (2015). The ABS has

² Across 11 industry clusters: agricultural products, animal products, base metals, electronics, fertilisers, finished metals, machinery, other foodstuffs, plastics & rubbers, textiles and wood products.

³ Measure of sampling variability “obtained by expressing the standard error as a percentage of the estimate to which it refers” (ABS, 2015).

recommended that results with an RSE of 25-50% should be used with caution, while those >50% are deemed to be too unreliable for general use. Finally, the data refer to road freight volumes by state of origin and destination, not the volumes actually originating in one state and destined for another.

3.1 Vehicle Types and Freight Movements

The 2014 Road Freight Movements survey included vehicles registered with a motor vehicle authority during the 12 months ending 31 October 2014. Unregistered vehicles and those below the GVM threshold were excluded, as was freight moved by the military or pipeline. The survey related to road freight movements by transport operators for hire or reward, as well as ancillary transport (i.e. farmers, manufacturers, retailers on their own account). Movements included both laden and unladen trips. In the case of trips involving more than one transport mode, only the road freight component was included.

3.2 Sample Size and Vehicle Attributes

The survey sample comprised 16,000 articulated and rigid trucks and was identified by ABS using information obtained from state and territory motor vehicle registration authorities, as part of the ABS Motor Vehicle Census (ABS cat. no. 9309.0 of 31 January 2013 in ABS, 2015). This included state / territory of registration, vehicle type (articulated or rigid), area of registration (capital city or rest of state), vehicle age (year of manufacture) and vehicle size (based on gross consolidated / combination mass or GCM)⁴.

3.3 Survey Period and Data Requested

Owners of vehicles included in the survey were asked to provide details of freight movements for a randomly-selected one week period which was then annualised. This included start and finish odometer reading for the week, usual garaged address and vehicle use and movements (i.e. origin & destination of each trip, commodity type, weight of load, distance travelled, trailer configuration and method of transportation).

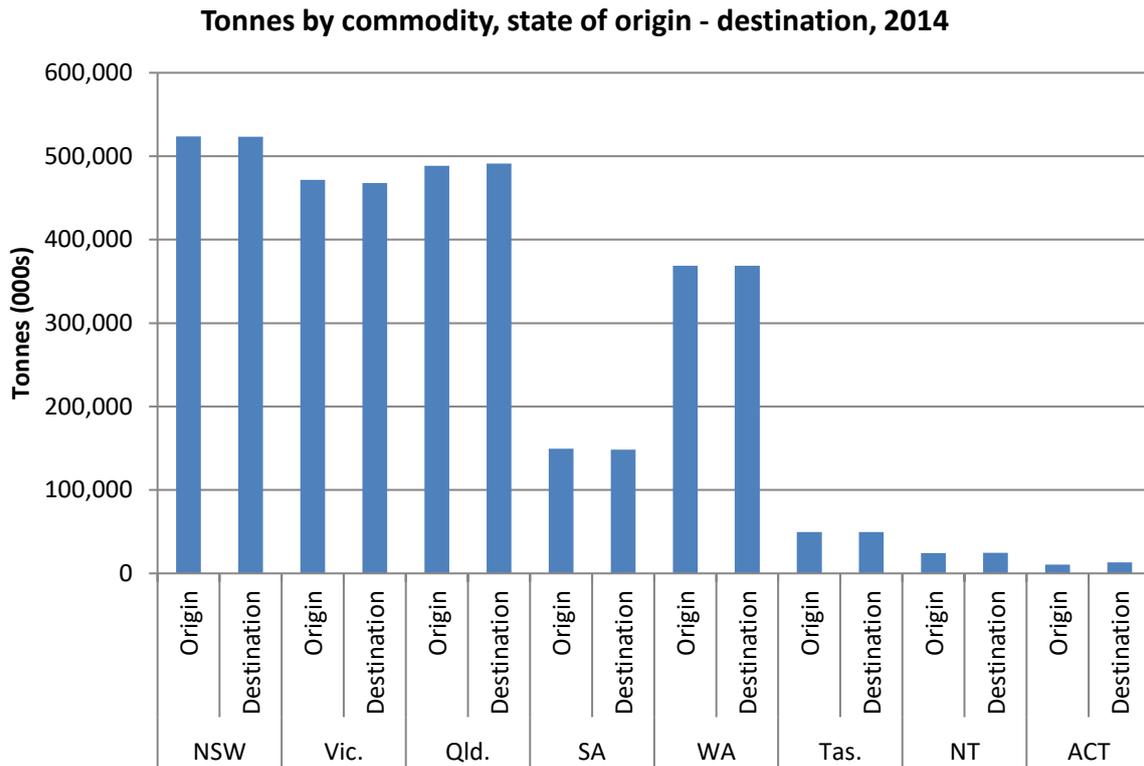
3.4 Overview of 2014 Survey Data

Data for the 2014 Road Freight Movements survey were broken down by commodity / freight type in terms of tonnes and tonne-km by state of origin and destination as summarised in Figures 1 and 2. Most states showed differences in origin and destination for both tonnes and tonne-km, indicating differences in interregional flows, with the exception of Tasmania (with no interregional road freight movements as such), as well as extensive, remote states of WA and NT.

Table 2 shows the percentage composition of road freight transport estimated in the 2014 Road Freight Movements survey by tonnes and tonne-km respectively. For most commodities, there is little difference either way, but not so for others. Food and general freight show a sizeable increase in percentage when measured in tonne-km, while sand, stone and gravel is characterised by a significant decrease when measured in tonne-km. The estimated total tonne-km for 2014 (i.e. 196 billion tonne-km) is reasonably close to the estimates produced by BITRE in Table 1, i.e. approximately 206 billion tonne-km.

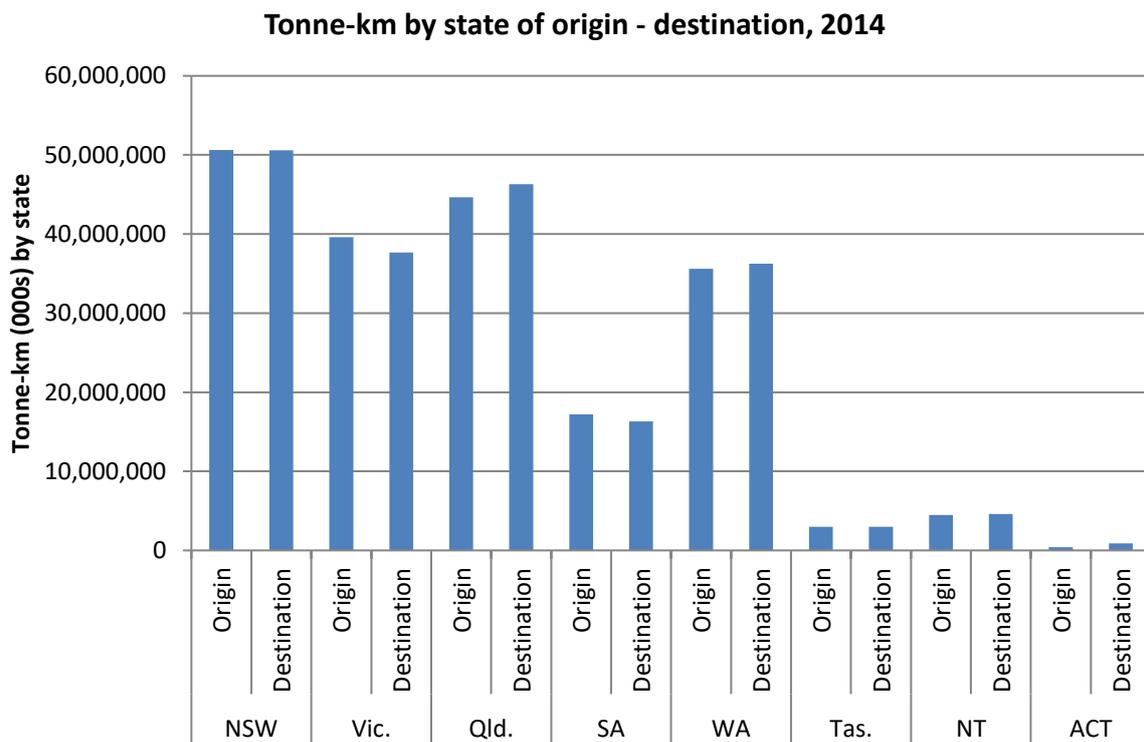
⁴ Gross vehicle mass (GVM) relates to rigid vehicles while gross combination (consolidated) mass (GCM) relates to combination or articulated vehicles.

Figure 1: Road Freight Tonnes by State of Origin-Destination, 2014



Source: ABS (2015).

Figure 2: Road freight tonne-km by state of origin-destination, 2014



Source: ABS (2015).

Table 2: Road freight transport volumes by commodity type, tonnes and tonne-km, 2014

Commodity type	Tonnes		Tonne-km	
	Tonnes (millions)	% of total	Tonne-km (billions)	% of total
Cereal grains	102.246	4.9	11.946	6.1
Food	209.791	10.1	30.544	15.6
Live animals	33.191	1.6	5.960	3.0
Beverages and tobacco	50.932	2.4	5.602	2.9
Crude materials	53.871	2.6	3.293	1.7
Metalliferous ores and metal scrap	96.697	4.6	10.568	5.4
Sand, stone and gravel	492.691	23.6	18.614	9.5
Cork and wood	62.085	3.0	6.091	3.1
Coal	44.679	2.1	1.274	0.7
Gases	12.865	0.6	1.500	0.8
Petroleum and petroleum products	72.164	3.5	9.135	4.7
Animal and vegetable oils, fats and waxes	2.116	0.1	0.519	0.3
Chemicals	24.629	1.2	2.430	1.2
Fertilisers	18.395	0.9	3.516	1.8
Tools of Trade	45.333	2.2	1.624	0.8
Cement and concrete	124.862	6.0	4.948	2.5
Iron and steel	28.062	1.3	3.974	2.0
Other manufactured articles	81.607	3.9	8.850	4.5
Machinery and transport equipment	81.475	3.9	7.713	3.9
Miscellaneous manufactured articles	23.720	1.1	3.234	1.7
General freight	277.724	13.3	43.759	22.4
Other commodity	192.570	9.2	10.524	5.4
Total	2,086.371	100.0%	195.619	100.0%

Source: Own calculation using Road Freight Movements survey data from ABS (2015)

4. METHODOLOGY

4.1 Calculation of 'Road Freight Transport' Quotients

The concept of the location quotient is applied in this paper to the 2014 Road Freight Movements survey (ABS, 2015) data to provide a basic, initial representation of the distribution of freight flows by state and commodity type across Australia. The form of the estimation is therefore set out in Equation 2:

$$\frac{RF_i^j / RF^j}{RF_i / RF} \quad (2)$$

Where:

RF_i^j = Road freight by commodity type i originating or ending in state j

RF^j = Total road freight originating or ending in state j

RF_i = Road freight by commodity type i in Australia as a whole

RF = Total road freight in Australia as a whole.

Thus, the form of the 'road freight transport' quotient calculation undertaken for the paper follows that used to estimate the conventional location quotient set out in Equation 1.

As described in Equation 2, 'road freight transport' quotients were calculated in this study using the breakdown of commodity types transported to and from each state in terms of tonnes and tonne-km. The results of the calculation for 'road freight transport' quotients are presented in Tables A.1 and A.2 for tonnes and tonne-km respectively in Appendices to this paper.

4.2 States' Outward Orientation by Commodity Type

This is an important metric for assessing interregional freight flows. A measure of outward orientation by state and commodity type presented in Equation 3 was compiled in terms of estimated origin and destination road freight transport quotients, results of which are contained in Tables B.1 and B.2 in Appendices to this paper. Where the origin > destination of volumes, this indicates a potential for surplus of that freight type which could be 'exported' to another state as an 'outward' interregional freight flow, after intra-state freight demand was met through the 'destination' volumes. Where origin < destination, this would indicate an 'inward' interregional freight flow or an 'import' requirement, as demand was higher than could be met through intra-state freight volumes alone and would have to be met by interstate freight flows.

$$\frac{RFQ_{Origin}}{RFQ_{Destination}} \quad (3)$$

Where:

RFQ_{Origin} = Road freight transport quotient for Origin by commodity type and state

$RFQ_{Destination}$ = Road freight transport quotient for Destination by commodity type and state.

5. RESULTS

Road freight transport quotients estimated in terms of tonnes and tonne-km are set out in detail in Appendices (Tables A.1 and A.2 respectively), and summarised in Figures 3 and 4 below. Estimates of the 'outward-orientation' derived from these quotients are likewise contained in Tables B.1 and B.2, and presented in Figures 5 and 6 of this paper. Estimates derived from results with an RSE of 25-50% (to be treated with caution) are identified by yellow shading in the tables, while those with an RSE >50% (too unreliable for general use) are indicated by red shading.

5.1 Road Freight Transport Quotients in Tonnes and Tonne-Km

Figures 3 and 4 show an important difference in the relative size of origins and destinations when measured in tonnes versus tonne-km. In terms of tonnes, Figure 3 shows the variation in origin-destination as relatively small, with the values following an almost 45 degree angle and a correlation coefficient of 0.976. However when viewed in tonne-km in Figure 4, the data is more spread out as distance becomes more varied across states, hence a correlation coefficient of 0.865.

The Road Freight Transport quotients in Tables A.1 and A.2 calculated for tonnes and tonne-km by commodity type, state and origin-destination show the prevalence of various commodities in certain states, as well as origin and destination. Some states show strong origin and destination quotients in certain commodities, e.g. a major source of coal is NSW with a road freight quotient of 3.63 indicating its importance as a freight type on that state's roads, while others, e.g. Victoria with a coal quotient of 0.02, are relatively minor in the transportation of these commodities by road, as are major coal-producing states such as Queensland where power stations would be located close to coal mines. Another notable example would be that of chemicals, where NSW shows road freight origin-destination quotients of 0.4 while Victoria, Queensland and South Australia all have quotients greater than 1 for this commodity type.

Substantial variation also occurs between states in tonne-km, as in the case of metalliferous ores in NSW, Victoria, Queensland and SA (all showing road freight quotients of less than 0.3), versus that of WA which showed a quotient of 4.5. Another example would be that of cork and wood products in Tasmania (road freight quotient of 5.13) or metalliferous ores in WA (road

freight quotient of 4.5). Differences in road freight tonne-km quotients between origin-destination can be observed in the case of cereal grains in NSW (1.12-0.65), cork and wood in SA (0.91-0.37), chemicals in NT (0.52-2.82) and animal and vegetable oils, fats & waxes in Victoria (0.29-1.17).

Table 3 shows the correlation of origin and destination for road freight quotients measured in tonnes and tonne-km in each state for all commodity types. As might be expected due to the variation in distances involved, the correlations of origins and destinations are higher in all states when measured in tonnes than in tonne-km (except the states of Tasmania and WA which are relatively isolated or self-contained). The largest variation in tonne versus tonne-km quotients occurs in states which need to ‘import’ or ‘export’ substantial amounts of material or products interstate due to the characteristics of their economies, e.g. South Australia, Northern Territory and ACT.

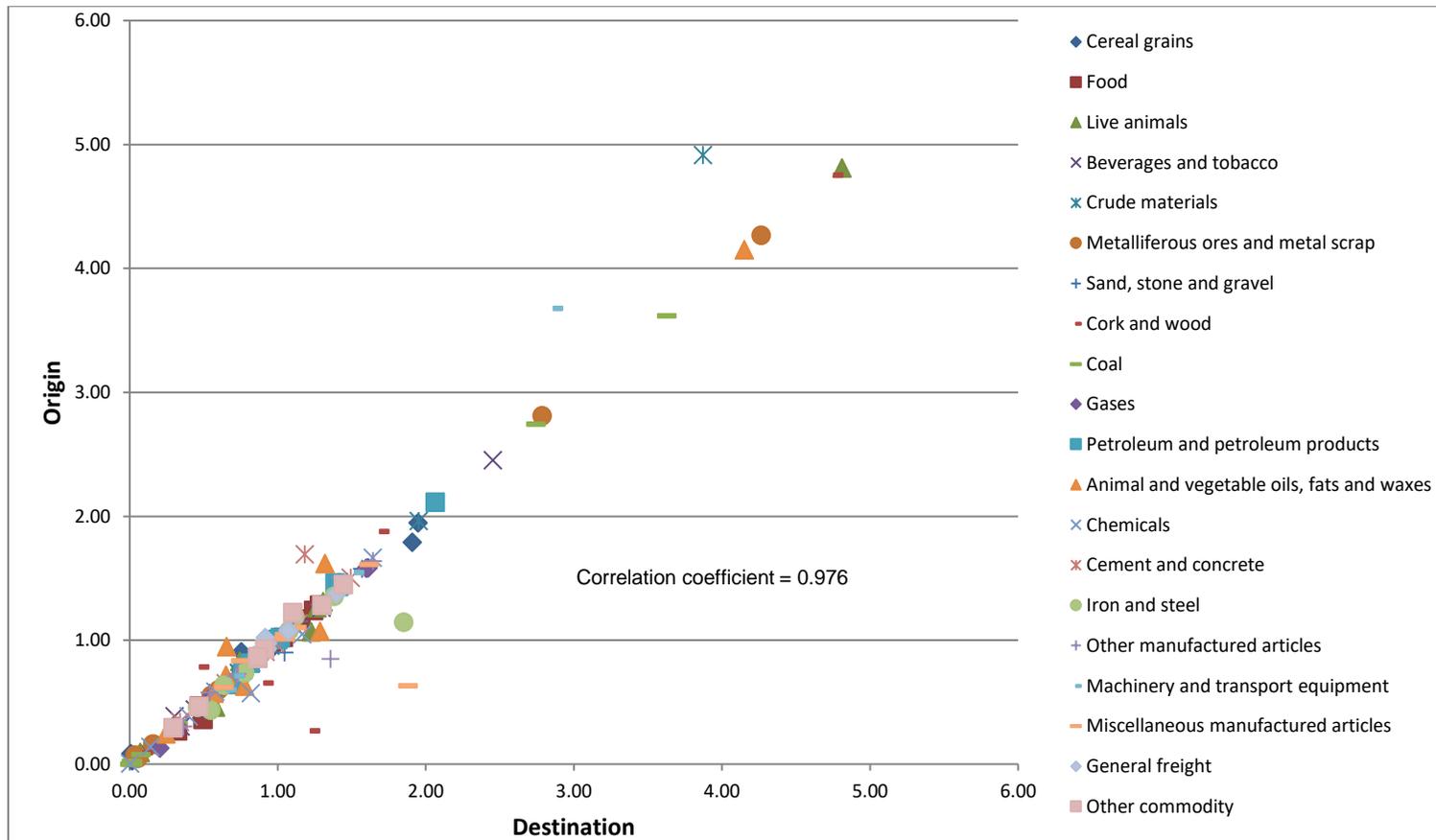
Table 3: Correlation Coefficients for Road Freight Transport Quotients in Terms of Origin-Destination, by State, Tonnes and Tonne-Km, 2014

State	Tonnes	Tonne-km
New South Wales	0.986	0.808
Victoria	0.987	0.909
Queensland	0.995	0.885
South Australia	0.979	0.747
Western Australia	1.000	0.999
Tasmania	1.000	1.000
Northern Territory	0.996	0.699
ACT	0.916	0.491

Source: Own calculation using Road Freight Movements survey data from ABS (2015).

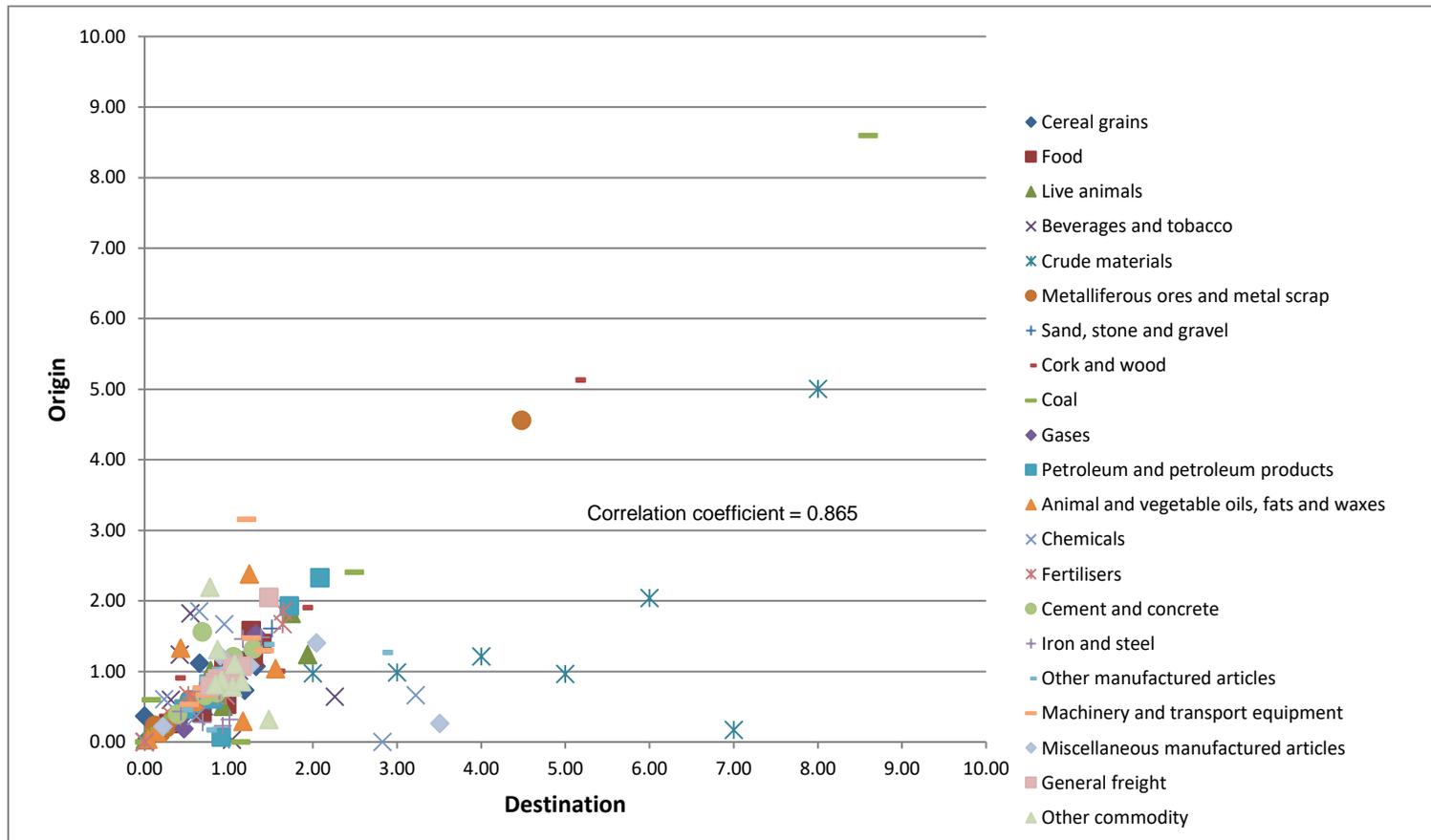
Similarly, when measured for each commodity type across all states in Table 4, the correlations of quotients for origins and destinations are higher overall when measured in tonnes than those measured in tonne-km. Substantial variations in quotients occur when measured in tonnes and tonne-km which gives important clues as to which commodity types feature in interregional freight flows, e.g. animal and vegetable oils, fats and waxes, chemicals, cement and concrete, as well as iron and steel and other manufactures.

Figure 3: Road Freight Transport Quotients Tonnes, by Commodity Type, 2014



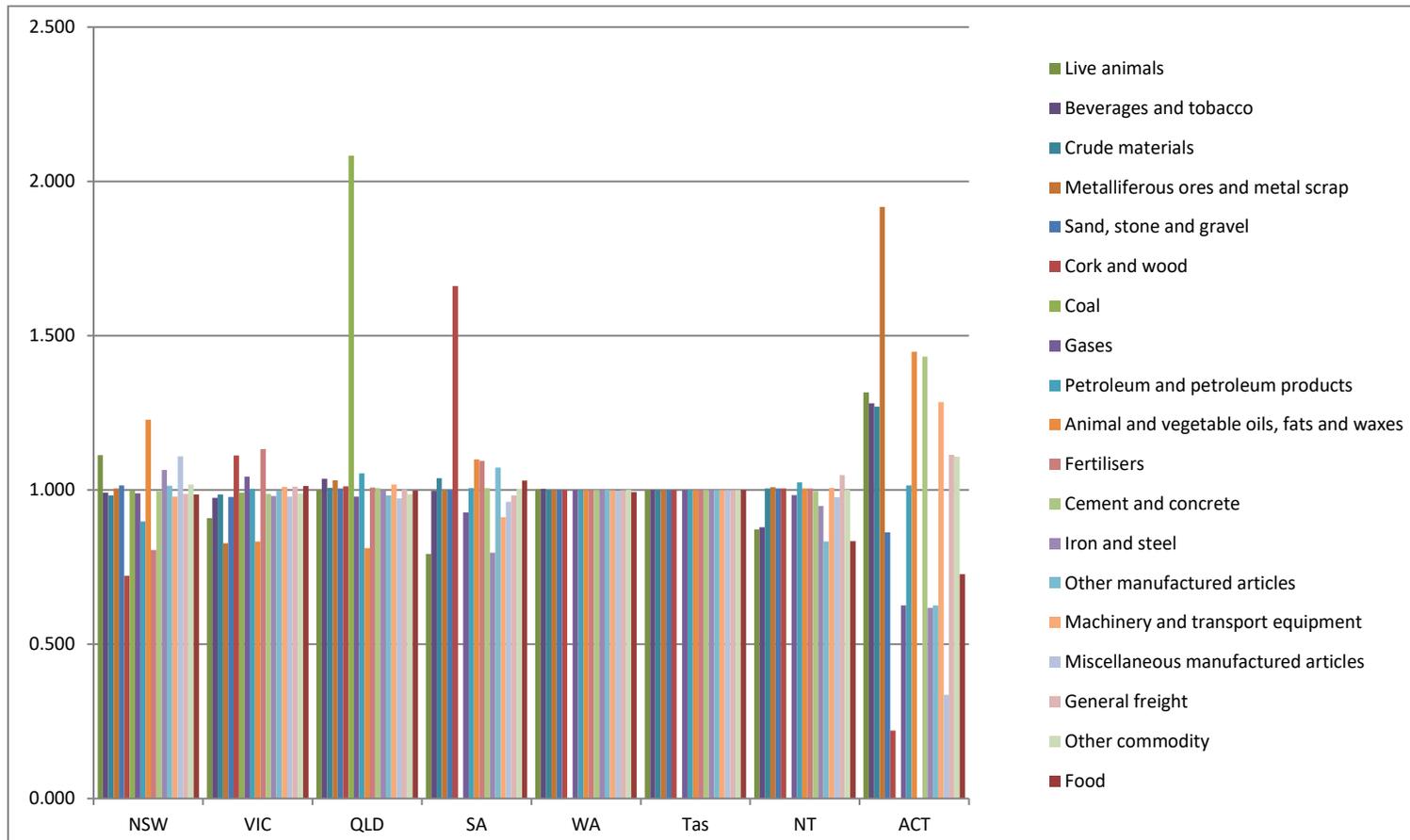
Source: Own calculation using Road Freight Movements survey data from ABS (2015).

Figure 4: Road Freight Transport Quotients in Tonne-Km, by State and Commodity Type, 2014



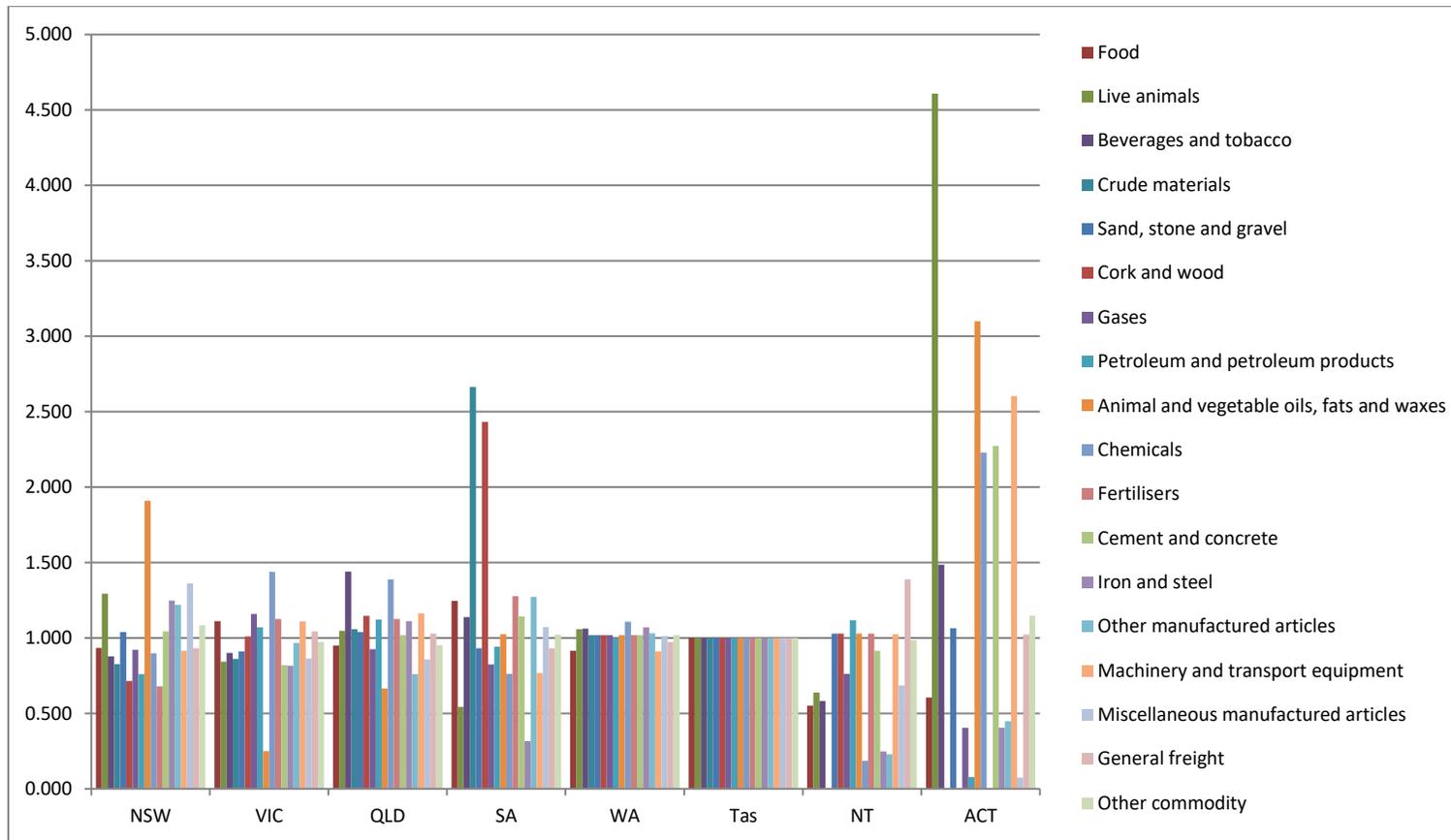
Source: Own calculation using Road Freight Movements survey data from ABS (2015).

Figure 5: Road Freight Transport Quotients in Tonnes, Outward Orientation by State and Commodity Type, 2014



Source: Own calculation using Road Freight Movements survey data from ABS (2015).

Figure 6: Road Freight Transport Quotients in Tonne-Km, Outward Orientation by State and Commodity Type, 2014



Source: Own calculation using Road Freight Movements survey data from ABS (2015).

Table 4: Correlation Coefficients for Road Freight Transport Quotients in Terms of Origin-Destination, by Commodity Type, Tonnes and Tonne-Km, 2014

Commodity type	Tonnes	Tonne-km
Cereal grains	0.994	0.859
Food	0.995	0.892
Live animals	0.999	0.875
Beverages and tobacco	0.998	0.921
Crude materials	0.995	0.821
Metalliferous ores and metal scrap	1.000	0.996
Sand, stone and gravel	0.981	0.992
Cork and wood	0.968	0.981
Coal	1.000	0.821
Gases	0.999	0.972
Petroleum and petroleum products	0.998	0.914
Animal and vegetable oils, fats and waxes	0.989	0.541
Chemicals	0.988	0.690
Fertilisers	0.982	0.976
Tools of trade	0.986	0.992
Cement and concrete	0.932	0.590
Iron and steel	0.856	0.684
Other manufactured articles	0.908	0.611
Machinery and transport equipment	0.995	0.620
Miscellaneous manufactured articles	0.292	-0.130
General freight	0.974	0.935
Other commodity	0.994	0.990

Source: Own calculation using Road Freight Movements survey data from ABS (2015).

5.2 Use of Road Freight Transport Quotients to Determine Outward Orientation

The variation in origin-destination volumes is shown in the ‘outward orientation’ metric (see Tables B.1 and B.2) which is calculated by dividing each origin quotient by the destination quotient for each commodity type and state. A factor of <1 indicates that origin < destination volumes, i.e. the state is more of a destination than an origin for freight flows of that commodity; a factor of >1 indicates that origin > destination for freight flows of that commodity.

Figures 5 and 6 provide these results in terms of tonnes and tonne-km respectively.

Figure 5 (summarising the results in Table B.1) shows that Queensland stands out because of its outward orientation in coal tonnage, South Australia as a generator of cork and wood volumes and NSW in live animals and animal and vegetable fats. The ACT shows a range of outward and inward movements across a range of commodities when measured in tonnes and tonne-km⁵. Moreover when measured in tonne-km, results in Figure 6 (summarising the results in Table B.2) exhibit greater variation in outward and inward orientation across a range of commodities in most states. South Australia shows outward orientation for crude materials and cork and wood, NSW for animal and vegetable oils and Queensland for beverages and tobacco; Northern Territory is heavily reliant on inward flows of most commodities.

6. CONCLUSIONS

While taking account of the questions regarding the reliability of some of the survey results in terms of RSE, road freight transport quotients nevertheless indicate the direction and relative

⁵ Noting, however, sampling variability in the survey results for ACT and other states in terms of RSE.

magnitude of interregional road freight flows (and estimated truck volumes if extended to this) within and between states via origin-destination (direction of movement), tonnes, tonne-km and commodity type. This is a critical input for commonwealth and state road authorities' road network management, as well as assisting in the allocation of funds for road investment across states. The measure of outward orientation also indicates the relative magnitude of origin-destination (outward-inward movement) for each state and commodity type. As location quotients, they also indicate the extent to which the state is over-or underrepresented in directional freight flows in that commodity type and could be used to augment location quotients based on population or employment data. In this way, they could also help in determining the *economic base* of the various states and identify which sectors could be targeted for investment to enhance consumption and processing of output within the state. Moreover, improvements in the reliability of some of the results in terms of the RSE in future surveys will enhance the credibility of the results and the road freight quotients; it could also result in a revised set of quotients that differ from those presented in this paper. Reliability of the data is all the more important given that the scale of the survey and the expense involved means that it can only be undertaken periodically.

7. FURTHER RESEARCH

The following possibilities for further research in the use of road freight transport quotients were identified:

- Development of a national and state level Freight Flow Atlas for Australia based on location quotients, initially at a state-level, similar to the National Freight Economy Atlas developed for the U.S. by the University of Minnesota. This could include Road Freight Flows and Rail Freight Flows and would be an important input to the analysis of freight demand and mode choice
- Research ways of improving the reliability of road freight data, especially for the commodity types identified in the Road Freight Movements survey 2014 as having an RSE >50%
- Undertake an *economic base* analysis to indicate which states are more outward-orientated and therefore which sectors / industry types might be targeted for investment. This could be compared to conventional analysis using location quotients derived from population, sectoral employment or output data
- Commodity type data provides a basis for the estimation of future interregional freight flows using available industry/economic sectoral data and projections, possibly linked to a regional economic model.

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APPENDICES

The Appendices follow this page.

Table A.1: Road Freight Transport Quotient: Tonnes by Commodity (2014)

	NSW		Vic.		Qld.		SA		WA		Tas.		NT		ACT	
	Origin	Dest.														
Cereal grains	0.90	0.75	0.93	0.96	0.37	0.49	1.79	1.91	1.95	1.95	0.08	0.08	0.08	0.01	0.03	0.02
Food	1.02	1.04	1.17	1.15	1.24	1.24	0.99	0.96	0.47	0.47	1.28	1.28	0.27	0.32	0.36	0.49
Live animals	0.83	0.74	0.47	0.51	1.26	1.26	0.46	0.58	1.31	1.31	4.81	4.81	1.07	1.22	0.09	0.07
Total Food & live animals	0.97	0.93	1.03	1.03	0.99	1.02	1.17	1.20	0.99	0.99	1.26	1.26	0.29	0.32	0.24	0.31
Beverages and tobacco	1.11	1.12	1.26	1.30	1.01	0.97	0.82	0.82	0.44	0.44	2.45	2.45	0.30	0.35	0.39	0.30
Crude materials	0.73	0.74	1.28	1.30	0.96	0.95	1.47	1.41	0.74	0.74	0.85	0.85	1.96	1.95	4.92	3.87
Metalliferous ores & metal scrap	0.55	0.55	0.05	0.06	0.16	0.16	0.16	0.16	4.27	4.27	0.60	0.60	2.81	2.79	0.07	0.04
Sand, stone and gravel	1.10	1.08	0.78	0.80	1.15	1.15	1.00	1.00	0.94	0.94	0.70	0.70	1.58	1.57	0.90	1.05
Cork and wood	0.65	0.91	1.88	1.69	0.56	0.56	0.78	0.47	0.61	0.61	4.75	4.75	0.09	0.09	0.27	1.22
Total Crude materials, excl. fuels	0.96	0.97	0.82	0.81	0.95	0.94	0.90	0.87	1.35	1.35	1.05	1.05	1.64	1.63	1.04	1.14
Coal	3.62	3.63	0.02	0.02	0.02	0.01	0.00	0.02	0.08	0.08	2.74	2.74	0.33	0.32	0.00	0.00
Gases	1.58	1.60	0.87	0.84	0.53	0.54	0.30	0.33	1.28	1.28	0.59	0.59	1.58	1.61	0.13	0.20
Petroleum and petroleum products	0.64	0.72	1.02	1.02	1.46	1.39	1.01	1.00	0.81	0.81	0.76	0.76	2.11	2.06	1.43	1.41
Total mineral fuels, lubricants & related materials	1.76	1.81	0.66	0.66	0.87	0.83	0.59	0.60	0.61	0.61	1.43	1.43	1.45	1.42	0.81	0.81
Animal and vegetable oils, fats and waxes	1.62	1.32	1.07	1.28	0.63	0.78	0.72	0.65	0.24	0.24	4.15	4.15	0.57	0.57	0.95	0.66
Chemicals	0.39	0.40	1.67	1.64	1.44	1.42	1.05	1.17	0.58	0.58	0.14	0.14	0.57	0.82	0.00	0.00
Fertilisers	0.85	1.06	1.50	1.33	0.48	0.48	1.35	1.24	1.21	1.21	0.96	0.96	0.02	0.02	0.00	0.00
Total chemicals & related products	0.59	0.68	1.60	1.51	1.03	1.02	1.18	1.20	0.85	0.85	0.49	0.49	0.34	0.48	0.00	0.00
Tools of Trade	1.30	1.30	0.85	0.85	1.07	1.06	1.05	1.07	0.61	0.61	0.97	0.97	1.37	1.34	1.98	1.69
Cement and concrete	1.14	1.14	0.91	0.92	1.50	1.49	0.65	0.65	0.47	0.47	0.34	0.34	0.98	0.98	1.69	1.18
Iron and steel	1.19	1.12	1.35	1.38	0.64	0.64	0.43	0.55	1.08	1.08	0.46	0.46	0.74	0.78	1.14	1.85
Other manufactured articles	1.03	1.02	1.64	1.64	0.71	0.72	0.58	0.54	0.73	0.73	1.10	1.10	0.30	0.36	0.85	1.36
Total manufactured goods classified by materials	1.11	1.09	1.21	1.23	1.12	1.12	0.60	0.60	0.64	0.63	0.62	0.62	0.71	0.74	1.33	1.32
Machinery and transport equipment	0.86	0.88	0.93	0.92	1.54	1.52	0.60	0.66	0.71	0.71	0.61	0.61	1.08	1.08	3.68	2.86
Miscellaneous manufactured articles	0.83	0.75	1.10	1.13	0.62	0.64	1.01	1.05	1.61	1.62	1.05	1.05	1.02	1.04	0.63	1.88
General freight	0.85	0.86	1.08	1.07	1.07	1.07	1.37	1.40	0.87	0.87	0.93	0.93	0.98	0.93	1.02	0.92
Other commodity	0.93	0.91	1.28	1.30	0.85	0.87	1.45	1.44	0.87	0.87	0.47	0.47	0.29	0.29	1.22	1.10
Total Commodities and transactions	0.88	0.88	1.16	1.16	0.98	0.99	1.40	1.42	0.87	0.87	0.74	0.74	0.70	0.67	1.10	0.99

Source: Own calculation using Road Freight Movements survey data from ABS (2015).

Table A.2: Road Freight Transport Quotient: Tonne-km by Commodity (2014)

	NSW		Vic.		Qld.		SA		WA		Tas.		NT		ACT	
	Origin	Dest.														
Cereal grains	1.12	0.65	1.18	1.21	0.73	1.19	1.07	1.32	1.11	1.10	0.10	0.10	0.37	0.00	0.04	0.03
Food	1.21	1.29	1.05	0.94	1.12	1.18	1.58	1.27	0.26	0.29	1.39	1.39	0.54	0.98	0.41	0.68
Live animals	1.01	0.78	0.64	0.76	1.82	1.74	0.51	0.93	0.60	0.57	0.67	0.67	1.24	1.94	0.03	0.01
Total Food & live animals	1.16	1.07	1.03	0.99	1.11	1.25	1.32	1.24	0.51	0.52	0.99	0.99	0.58	0.85	0.27	0.44
Beverages and tobacco	0.98	1.12	2.03	2.26	0.78	0.54	0.80	0.70	0.33	0.31	0.98	0.98	0.24	0.42	1.54	1.04
Crude materials	0.97	1.17	0.97	1.13	0.98	0.93	1.21	0.45	0.96	0.95	2.04	2.04	0.17	0.17	5.00	2.26
Metalliferous ores & metal scrap	0.21	0.26	0.13	0.19	0.24	0.12	0.19	0.22	4.56	4.48	0.37	0.37	0.60	0.53	0.33	0.01
Sand, stone and gravel	1.13	1.08	0.75	0.82	1.07	1.03	0.88	0.94	1.03	1.01	1.16	1.16	1.17	1.14	1.61	1.51
Cork and wood	0.77	1.07	1.90	1.89	0.61	0.53	0.91	0.37	0.64	0.63	5.13	5.13	0.01	0.01	1.00	1.55
Total Crude materials, excl. Fuels	0.80	0.86	0.78	0.84	0.76	0.69	0.72	0.61	1.93	1.90	1.65	1.65	0.74	0.71	1.45	1.17
Coal	2.40	2.49	0.17	0.18	0.60	0.08	0.00	1.14	0.35	0.35	8.60	8.60	0.46	0.45	0.00	0.00
Gases	0.93	1.01	1.53	1.32	0.87	0.94	0.40	0.49	1.07	1.05	0.54	0.54	0.58	0.76	0.19	0.47
Petroleum and petroleum products	0.61	0.80	0.82	0.77	1.93	1.72	0.85	0.91	0.55	0.55	0.47	0.47	2.33	2.08	0.07	0.91
Total mineral fuels, lubricants & related materials	0.84	1.01	0.84	0.77	1.65	1.45	0.71	0.88	0.59	0.59	1.35	1.35	1.91	1.74	0.08	0.76
Animal and vegetable oils, fats and waxes	2.38	1.25	0.29	1.17	1.04	1.56	0.57	0.56	0.14	0.14	0.59	0.59	0.04	0.04	1.33	0.43
Chemicals	0.75	0.83	0.93	0.65	0.85	0.61	2.46	3.22	1.05	0.95	0.23	0.23	0.52	2.82	0.00	0.00
Fertilisers	0.66	0.97	1.85	1.65	0.37	0.32	0.66	0.52	1.67	1.64	0.60	0.60	0.00	0.00	0.00	0.00
Total chemicals & related products	0.69	0.91	1.48	1.24	0.57	0.44	1.40	1.62	1.42	1.36	0.45	0.45	0.21	1.16	0.00	0.00
Tools of Trade	0.24	0.23	0.20	0.19	0.27	0.27	0.07	0.08	0.15	0.17	0.02	0.02	0.05	0.03	0.02	0.02
Cement and concrete	1.10	1.05	0.70	0.85	1.32	1.29	1.21	1.06	0.79	0.77	0.39	0.39	0.66	0.72	1.56	0.69
Iron and steel	1.46	1.17	0.72	0.89	0.72	0.65	0.32	1.01	1.48	1.39	0.43	0.43	0.23	0.93	0.28	0.69
Other manufactured articles	1.19	0.98	1.38	1.43	0.73	0.96	1.03	0.81	0.77	0.75	0.46	0.46	0.17	0.74	1.27	2.84
Total manufactured goods classified by materials	1.23	1.04	1.05	1.15	0.89	0.98	0.92	0.92	0.93	0.90	0.43	0.43	0.32	0.78	1.13	1.76
Machinery and transport equipment	0.67	0.73	0.76	0.69	1.47	1.27	0.77	1.00	1.29	1.42	0.53	0.53	0.86	0.84	3.16	1.21
Miscellaneous manufactured articles	1.22	0.90	1.08	1.25	0.80	0.93	0.88	0.82	0.93	0.92	0.22	0.22	1.40	2.04	0.26	3.51
General freight	1.00	1.07	1.09	1.04	0.89	0.87	1.07	1.15	0.89	0.91	0.84	0.84	2.05	1.48	0.79	0.78
Other commodity	1.10	1.02	0.78	0.80	1.31	1.37	0.85	0.84	0.87	0.86	0.81	0.81	0.32	0.33	2.19	1.92
Total Commodities and transactions	1.02	1.06	1.03	1.00	0.97	0.97	1.03	1.09	0.89	0.90	0.84	0.84	1.71	1.25	1.07	1.00

Source: Own calculation using Road Freight Movements survey data from ABS (2015).

Table B.1: Tonnes by commodity (2014): Outward orientation

	NSW	Vic.	Qld.	SA	WA	Tas.	NT	ACT
Cereal grains	1.201	0.971	0.766	0.938	1.000	1.000	12.636	1.529
Food	0.985	1.013	0.998	1.031	0.993	1.000	0.834	0.727
Live animals	1.113	0.909	0.999	0.793	1.002	1.000	0.872	1.317
Total Food & live animals	1.047	0.997	0.965	0.976	0.999	1.000	0.923	0.753
Beverages and tobacco	0.991	0.974	1.037	0.997	1.004	1.000	0.879	1.281
Crude materials	0.982	0.985	1.006	1.039	1.001	1.000	1.005	1.270
Metalliferous ores & metal scrap	1.005	0.827	1.031	0.998	1.001	1.000	1.009	1.917
Sand, stone and gravel	1.014	0.977	1.005	1.000	1.001	1.000	1.005	0.862
Cork and wood	0.722	1.112	1.012	1.661	1.001	1.000	1.005	0.221
Total Crude materials, excl. Fuels	0.988	1.001	1.006	1.036	1.001	1.000	1.006	0.912
Coal	0.998	0.992	2.083	0.000	1.001	1.000	1.005	0.000
Gases	0.990	1.043	0.979	0.927	1.001	1.000	0.983	0.626
Petroleum and petroleum products	0.898	1.004	1.054	1.006	1.000	1.000	1.024	1.015
Total mineral fuels, lubricants & related materials	0.975	1.009	1.054	0.991	1.000	1.000	1.018	1.005
Animal and vegetable oils, fats and waxes	1.227	0.833	0.811	1.099	1.001	1.000	1.005	1.448
Chemicals	0.971	1.015	1.016	0.899	1.012	1.000	0.701	1.274
Fertilisers	0.805	1.132	1.008	1.095	1.001	1.000	1.005	0.000
Total chemicals & related products	0.861	1.059	1.014	0.985	1.005	1.000	0.707	1.274
Tools of Trade	1.002	0.997	1.005	0.976	0.999	1.000	1.024	1.169
Cement and concrete	0.996	0.987	1.006	1.006	1.001	1.000	0.996	1.432
Iron and steel	1.065	0.980	1.001	0.797	1.001	1.000	0.948	0.618
Other manufactured articles	1.014	0.997	0.982	1.073	1.001	1.000	0.833	0.626
Total manufactured goods classified by materials	1.010	0.991	1.000	1.004	1.001	1.000	0.962	1.008
Machinery and transport equipment	0.979	1.010	1.018	0.912	0.999	1.000	1.007	1.285
Miscellaneous manufactured articles	1.109	0.978	0.972	0.961	0.997	1.000	0.976	0.336
General freight	0.987	1.011	1.002	0.983	0.999	1.000	1.049	1.114
Other commodity	1.018	0.989	0.986	1.004	1.001	1.000	1.001	1.108
Total Commodities and transactions	1.000	1.001	0.996	0.992	0.999	1.000	1.040	1.112

Source: Own calculation using Road Freight Movements survey data from ABS (2015).

Table B.2: Tonne-km by commodity (2014): Outward orientation

	NSW	Vic.	Qld.	SA	WA	Tas.	NT	ACT
Cereal grains	1.705	0.971	0.615	0.810	1.008	1.000	1186.331	1.552
Food	0.933	1.111	0.950	1.246	0.914	1.000	0.552	0.605
Live animals	1.293	0.842	1.046	0.542	1.057	1.000	0.638	4.608
Total Food & live animals	1.082	1.043	0.888	1.066	0.982	1.000	0.682	0.627
Beverages and tobacco	0.877	0.900	1.440	1.139	1.061	1.000	0.582	1.486
Crude materials	0.826	0.861	1.058	2.664	1.018	1.000	1.028	2.210
Metalliferous ores & metal scrap	0.790	0.652	1.975	0.861	1.018	1.000	1.129	61.591
Sand, stone and gravel	1.039	0.911	1.038	0.932	1.018	1.000	1.028	1.064
Cork and wood	0.714	1.009	1.147	2.433	1.018	1.000	1.028	0.644
Total Crude materials, excl. Fuels	0.930	0.924	1.098	1.178	1.018	1.000	1.049	1.242
Coal	0.965	0.951	7.330	0.000	1.018	1.000	1.028	0.000
Gases	0.922	1.158	0.926	0.823	1.018	1.000	0.762	0.405
Petroleum and petroleum products	0.761	1.069	1.121	0.941	1.000	1.000	1.118	0.078
Total mineral fuels, lubricants & related materials	0.835	1.085	1.143	0.802	1.005	1.000	1.096	0.103
Animal and vegetable oils, fats and waxes	1.909	0.249	0.665	1.025	1.018	1.000	1.028	3.101
Chemicals	0.898	1.438	1.389	0.762	1.108	1.000	0.185	2.229
Fertilisers	0.680	1.126	1.126	1.276	1.018	1.000	1.028	0.000
Total chemicals & related products	0.761	1.192	1.275	0.859	1.043	1.000	0.185	2.229
Tools of Trade	1.049	1.053	0.983	0.824	0.902	1.000	1.690	0.714
Cement and concrete	1.043	0.819	1.018	1.142	1.018	1.000	0.915	2.274
Iron and steel	1.248	0.816	1.112	0.315	1.070	1.000	0.246	0.404
Other manufactured articles	1.218	0.966	0.760	1.272	1.032	1.000	0.228	0.447
Total manufactured goods classified by materials	1.176	0.910	0.906	0.997	1.041	1.000	0.410	0.642
Machinery and transport equipment	0.914	1.108	1.163	0.767	0.912	1.000	1.025	2.604
Miscellaneous manufactured articles	1.361	0.863	0.856	1.072	1.013	1.000	0.686	0.074
General freight	0.931	1.044	1.028	0.931	0.973	1.000	1.388	1.022
Other commodity	1.084	0.972	0.952	1.022	1.018	1.000	0.985	1.146
Total Commodities and transactions	0.959	1.033	1.007	0.944	0.981	1.000	1.367	1.068

Source: Own calculation using Road Freight Movements survey data from ABS (2015).

The Changing Endogenous Employment Performance of Australia's Five Big Cities since the Mid-1990s

Alistair Robson and Robert J. Stimson

Centre for Economic and Regional Development, Department of Premier and Cabinet, New South Wales Government

University of Melbourne and University of Queensland, Australia

rstimson@unimelb.edu.au

ABSTRACT

Australia has been experiencing significant changes in the industrial structure of its economy over the past two decades with a falling share of employment in manufacturing as it continues the transition to an economy dominated by both consumer and producer services. This is particularly evident across the nation's five major cities – Sydney, Melbourne, Perth and Adelaide – which are primate cities in their states and are the prime generators of gross domestic product (GDP). The transition is uneven geographically, with marked differences in the structure and performance of those cities. The paper measures and compares the strength of the economic performance of those cities and their industrial structures, first over the period 1996-2006, and then over the subsequent decade 2006-2016, using a measure of *endogenous* regional employment performance – which can be either *positive* or *negative* – derived from the regional or differential shift component of a Regional Shift-Share Analysis. Changes in the performance of the cities over those two successive decade periods are highlighted, and the implications are discussed.

1. INTRODUCTION

The Australian economy has experienced significant changes in its industrial structure in recent decades. Broadly, there has been a large shift from manufacturing industry employment to employment in the diversified services industries, both the consumer (population oriented) services and producer services. Such change is similar to that occurring in many other OECD countries. But there are, of course, significant geographic differences in that transition, and that is evident in the different industrial structures and performance of the five big metropolitan cities - Sydney, Melbourne, Brisbane, Perth and Adelaide (in order of population size). This paper analyses the structures and performance of those five big cities over two successive ten-year periods, 1996-2006 and 2006-2016.

The first period – 1996-2016 – was characterised by sustained strong economic growth nationally as the country continued its strong recovery from the recession of the early 1990s. The second period – 2006-2016 – was one in which the shock of the Global Financial Crisis (GFC) struck in 2007-08 impacting regions with different degrees of severity, while due to the continuation of the resources boom which lasted until its bust early in the 2010s, Australia in

aggregate as a nation was shielded from having a technical recession. But internationally, in the post GFC period, the level of economic growth in Australia has continued quite strongly even though some regions have struggled.

The industry structure and economic performance of the five big cities over the ten years 1996-2006 was analysed by Robson (2011), while this paper analyses that performance for the subsequent ten years 2006-2016, the concern being to identify changes over time in the nature and strength of that performance both between the cities and for each city. In both cases, the focus has been on investigating the strength or weaknesses in the *endogenous* regional employment performance for the five cities in aggregate, and also for their industry sectors using the 2-digit industry classification. To do that we use the regional or differential component (standardised by the size of the work force) derived from a Regional Sift-Share Analysis (SSA) (employing the Haynes and Dinc, 1997 approach) of employment change over time. That surrogate measure of endogenous performance was proposed by Stimson, Stough and Salazar (2005), Stimson and Stough (with Salazar (1999) and Stimson and Stough (2011). And it has been used to analyse and model the determinants of endogenous regional employment performance across Australia's regional LGAs (Stimson, Robson and Shyy, 2009; 2011) and across functional economic regions (FERs) in Australia (Stimson, Mitchell, Rohde and Shyy, 2011; Stimson, Mitchell, Flanagan, Baum and Shyy, 2016; Stimson, Flanagan, Mitchell, Baum and Shyy, 2018).

That measure of endogenous regional employment performance of the five big cities focussing on trends over the two successive ten-year periods – both in aggregate and by industry sectors between the five big cities – is used in this paper. It highlights differences between the cities and changes over time within each of them. Implications of the findings are also canvassed.

2. AUSTRALIA'S FIVE BIG CITIES: SHARES OF STATE POPULATION, WORKING AGE POPULATION AND EMPLOYMENT

The five big city regions¹ of Sydney, Melbourne, Brisbane, Perth and Adelaide dominate Australia as the primate cities and the capital cities in their respective states. In 2016, those cities accounted for more than two-thirds of Australia's population and total employment, and that had been increasing over the 20 years from 1996. Their populations ranged from 1.3 million in Adelaide to more than 5 million in Sydney and approaching that for Melbourne.

But historically those cities have not always been so dominant, as back in 1901 they accounted for just 36% of Australia's population (Australian Bureau of Statistics, 1997, p. 18). However, since that time – and especially during the post-World War II years – they have exhibited increasingly important agglomeration economies attracting investment, new immigrants to settle (especially to Sydney and Melbourne), and the in-movement of younger age cohorts for education and to seek employment in their diversified labour markets to reach their current the level of dominance.

That dominance of the metropolitan regions has been evident in all states (see Table 1), but a little less so in Queensland, which is a comparatively special case where the regions to the South, West and North² of Brisbane have strong economic linkages to each other, and it is referred to as the South-East Queensland Region. Even so, that region has become increasingly important to account for 67% of the state's population and 66% of its employment by 2006, broadly on par with the other state capital city regions.

¹ As defined by Statistical Divisions.

² The Southern region refers to the Gold Coast Statistical Division, the Western region to the West Moreton Statistical Division, and the Northern region to the Sunshine Coast statistical Division.

Table 1: Employment and Working Age Population for Capital City Regions and Rest of State, 2016

State	Region	Employment (no.)	Working Age Population (15-64) (no.)	Employment to Working Age Population Ratio (no.)
New South Wales	Sydney	2,272,718	3,251,132	0.70
	Rest of State	1,107,624	1,625,122	0.68
Victoria	Melbourne	2,115,493	3,036,030	0.70
	--Rest of State	620,639	887,098	0.70
Queensland	Brisbane	1,073,778	1,522,336	0.71
	--Rest of State	1,062,672	1,550,214	0.69
South Australia	Adelaide	587,060	846,274	0.69
	--Rest of State	159,045	230,784	0.69
Western Australia	Perth	920,196	1,304,511	0.71
	--Rest of State	237,538	347,033	0.68
Australia	5-Capital City regions	6,969,245	9,960,283	0.70
	--Rest of Australia	3,714,600	5,400,229	0.69

Source: The authors using data from the ABS (2017) 2016 Census of Population and Housing.

While official government production data for capital cities is unavailable, state production data provide a context investigation for capital city employment changes. Table 2 shows small declines in the share of national real Gross State Product (GSP) were recorded in New South Wales, Victoria and South Australia, while Western Australia increased its share. That was similar to their experience during the previous ten-year period 1996-2006, except Queensland had increased its share, while for South Australia and Western Australia it had remained constant.

Table 2: Gross State Product, Chain Volume Measures³

	GSP level - 2006		GSP level - 2016		GSP change	
	(\$m.)	(% of Australia)	(\$m.)	(% of Australia)	(%)	Share (p.p.'s)
New South Wales	432,164	34	542,281	33	25	-1.7
Victoria	305,063	24	386,140	23	27	-1.0
Queensland	228,285	18	303,352	18	33	0.1
South Australia	83,882	7	99,627	6	19	-0.7
Western Australia	148,829	12	239,581	14	61	2.6
Tasmania	23,991	2	28,264	2	18	-0.2
Territories ⁴	42,105	3	60,359	4	43	0.3
Australia (GDP)	1,257,820	100	1,659,604	100	32	—

Source: The authors using data from ABS, cat. no.: 5220.0 - Australian National Accounts: State Accounts, 2016-17; Table 1 Gross State Product, Chain volume measures and current prices.

The shifts in production are largely replicated in the shifts occurring in employment, but not entirely (Table 3). The share of New South Wales, Queensland and Tasmania remained constant, while it declined in South Australia. The share of Victoria and Western Australia was up. These changes reversed some of the changes in share of employment over the previous

³ 2006 refers to 2005-06 and 2016 refers to 2015-16. Data may not sum due to rounding.

⁴ Australian Capital Territory and the Northern Territory.

decade 1996-2006, when New South Wales had had a decline in its share, while the share of Queensland had increased.

Table 3: Employment by State⁵

	Employment level - 2006		Employment level - 2016		Employment change	
	(m.)	(% of Australia)	(m.)	(% of Australia)	(%)	Share (p.p.'s)
New South Wales	2.9	32	3.4	32	16	-0.3
Victoria	2.3	25	2.7	26	20	0.6
Queensland	1.8	20	2.1	20	17	—
South Australia	0.7	8	0.7	7	8	-0.6
Western Australia	0.9	10	1.2	11	24	0.6
Tasmania	0.2	2	0.2	2	6	-0.2
Territories ⁶	0.3	3	0.3	3	17	—
Australia	9.1	100	10.7	100	17	—

Source: The authors using data from the ABS (2017) 2016 Census of Population and Housing.

As shown in Table 4, over the ten years 2006 to 2016 there was little change in the relative dominance of the five big cities compared with their states in terms of working age population and employment.

Table 4: Capital City Shares of State Employment and Population, 2016

	Employment		Working age population (15-64)		Employment to working age population (15-64) ratio	
	Level in 2016	Change, 2006 to 2016	Level in 2016	Change, 2006 to 2016	Level in 2016	Change, 2006 to 2016
	(% of state)	(pps of state)	(% of state)	(% of state)	(% of state)	(pps of state)
Sydney	67	1.8	67	2.0	101	-0.4
Melbourne	77	2.1	77	2.1	100	-0.1
Brisbane	50	1.0	50	1.2	101	-0.5
Adelaide	79	1.2	79	1.3	100	-0.1
Perth	79	1.5	79	1.4	101	0.2
5-capital city weighted average	69	1.7	70	1.7	101	-1.0

Source: The authors using data from the ABS (2017) 2016 Census of Population and Housing.

In 2016, the five big cities' share of state employment was 69%, up from 65% in 2006, while their share of the working age population was up from 65% in 2006 to 70% in 2016. For all five cities, their shares of both employment and of the working age population were up between 2006 and 2016, and that increase was most marked for Melbourne, followed by Sydney. That was a change from the previous ten-year period 1996-2006 when Perth and Brisbane had had the greatest increase in share of the state's employment, while Melbourne had had the greatest increase in share of the state's working age population. It is worth noting that for Sydney there was a significant change occurring between over the 20-year period from 1996. For the 1996-2006 period Sydney had a slight decline in the share of the state's employment but that was reversed to an increase in share for period 2006-2016. The same happened for Adelaide.

⁵ Data may not sum due to rounding.

⁶ Australian Capital Territory and the Northern Territory.

Melbourne had a most significant increase in its share of the state employment from 2006 to 2016 while it had had only a very marginal gain for the earlier decade 1996-2006.

Overall, labour force engagement as measured by the employment to working age (15 to 64 years) population ratio was down a little between 2006 and 2016 in the five cities, and it was greatest in Sydney and Brisbane. This was the period covering the GFC and the subsequent post-GFC recovery. But the previous decade 1996-2006 had also seen a decline in the employment to working age population. In that ten-year period Brisbane had the highest ratio of employment to working age population. But for the decade 2006-2016 that had changed, with all five cities having basically the same ratio of 100 or 101 on this measure of labour force engagement.

As shown in Table 5, all five cities had a substantial growth in their employment and working age populations from 2006 to 2016, as did the regional areas in the rest of their states. The greatest percentage increase in employment was for Perth and Melbourne, while Adelaide lagged well behind, and that was the same for their increase in working age population. The greatest increase in the ratio of employment to working age population was recorded by Sydney, while it was negative for both Brisbane and Perth.

Table 5: Change in Employment and Working Age Population, 2006-2016

State	Region	Employment		Working age Population (15-64)		Employment to Working age population (15-64) ratio	
		(no.)	(%)	(no.)	(%)	(no.)	(%)
New South Wales		470,879	16.2	531,780	12.2	0.02	3.5
	Sydney	369,184	19.4	442,952	15.8	0.02	3.1
	Rest of NSW	101,695	10.1	88,828	5.8	0.03	4.1
Victoria		461,686	20.3	616,010	18.6	0.01	1.2
	Melbourne	403,607	23.6	545,851	21.9	0.01	1.4
	Rest of VIC	58,079	10.3	70,159	8.6	0.01	1.6
Queensland		311,451	17.1	457,450	17.5	—	-0.4
	Brisbane	174,068	19.3	257,246	20.3	-0.01	-0.8
	Rest of QLD	137,383	14.8	200,204	14.8	—	—
South Australia		56,214	8.1	76,679	7.7	—	0.4
	Adelaide	52,440	9.8	72,827	9.4	—	0.4
	Rest of SA	3,774	2.4	3,852	1.7	—	0.7
Western Australia		221,598	23.7	324,439	24.4	—	-0.6
	Perth	190,623	26.1	274,491	26.6	—	-0.4
	Rest of WA	30,975	15.0	49,948	16.8	-0.01	-1.6
Tasmania		11,843	5.8	9,675	3.1	0.02	2.6
Northern Territory		15,538	17.8	26,970	19.8	-0.01	-1.7
Australian Capital Territory		29,334	16.6	42,390	18.4	-0.01	-1.5
Other Territories		1,096	102.2	1,420	87.0	0.05	8.1
Australia		1,579,645	17.4	2,086,813	15.7	0.01	1.4
	5-capital cities	1,189,916	20.6	1,593,367	19.0	0.01	1.3
	Rest of AUS.	389,729	11.7	493,446	10.1	0.01	1.5

Source: The authors using data from the ABS (2017) 2016 Census of Population and Housing.

Those outcomes for the 10-year period 2006-2016 contrast with those for the previous 10-year period 1996-2006 when Brisbane and Perth had experienced the highest percentage growth in employment, while for Adelaide and Sydney the growth was well behind the other cities. For

that decade Brisbane clearly led in its percentage growth in working age population while Adelaide had lagged well behind the other cities in its percentage increase in working age population. But Adelaide had had the greatest increase in its employment to working age population, while it was lowest in Sydney. On the ratio of employment to working population change over the period 1996-2006, Melbourne and Adelaide had led, while Sydney was well behind.

Those dynamics in the relative changes occurring over the successive 10-year periods 1996-2006 and 2006-2016 in the percentage change in employment, in working age population and in the ratio of employment to working age population are thus complex and the performance of the five big cities varied both for each of the 10-year periods and over time between them. That may be attributable to either the performance each of the big cities or of the rest of the state, the industrial structure of the cities and their states, and to *exogenous* factors relating to the national and international economies.

Very prominent was the relatively large increase in employment and working age population in Queensland (up 472,859 and 420,220 respectively). In percentage terms, the increase was 30% and 20% for employment and working age population respectively over the 10 years to 2006, higher than the 19% and 13% for the national average. The stronger growth in Queensland's employment compared with working age population was reflected in the 6.9% rise in its employment to working age population ratio. That compared with 5.3% for Australia as a whole, and 4.2% for the average for the five big cities. That stronger growth in the employment to working age population ratio occurred even though it was equal to the national average in 1996.

3. DIFFERENT EMPLOYMENT STRUCTURES OF THE CAPITAL CITIES

One explanation for the divergent growth rates of employment is the different industrial structures of the five big city economies (see Table 6). Some cities may have relatively more employment in industries that are growing, which tend to be the diverse services sectors. Comparatively, other cities may have relatively more employment in industries that are declining, such as manufacturing.

In 2016, some of the key differences between the cities include the following:

- as expected, employment in *agriculture/forestry and fishing* continues to remain negligible in all five cities;
- employment in *electricity/gas /water and waste services* remains at only 1% in all the cities;
- Perth is dominant for employment in *mining* at 5%, and that was well up from the level 1996, but it remains negligible in the other cities;
- *manufacturing* employment, which continues to decline, is still relatively highest in Melbourne and Adelaide at 8% and is lowest in Sydney and Perth at 6%, and the decline in the percentage of employment in manufacturing has been very substantial for all five cities since 1996;
- *construction* employment is slightly higher in Brisbane and Perth at 9% and 10% respectively, and the levels were up from 1996;
- employment in *wholesale trade* is highest in Sydney and Melbourne at 4%, and it was down in all cities from its level in 1996;

- employment in *retail trade* is an important part of the economies of the cities and is highest in Adelaide at 11% and lowest in Sydney at 9%, and for all cities the level was the same as in 1996;
- in all cities *accommodation and food services* sector employment is 6% or 7%, and this is up for most cities from the level it was in 1996;
- employment in *transport/postal and warehousing* is strongest in Brisbane at 6% and lowest in Adelaide at 4%, and not much had changed in the cities since 1996;
- Sydney dominates employment in the *information media and telecommunications* sector at 3% and is insignificant in Brisbane, Adelaide and Perth, but for all cities the level was down from what it was in 1996;
- Sydney is the stand-out city for employment in *financial and insurance services* at 6% followed by Melbourne at 4%, while it is only 3% in Brisbane, Adelaide and Perth, and for most cities it was down a little from the level it was in 1996;
- employment in *rental/hiring and real estate services* remains at 15 or 2% in all the cities;
- Sydney is also dominant for employment in *professional/scientific and technical services* at 10%, followed by Melbourne at 9%, with Adelaide well behind at 6%, and for Sydney, Melbourne and Brisbane the level was up from what it was in 1996;
- employment in *public administration and safety* is highest in Adelaide at 8% and is lowest in Sydney and Melbourne at 4%, and employment in this sector was up in Adelaide since 1996;
- there is little variation in employment in *administrative and support services* at 3% or 4%, levels that have declined in all five cities since 1996;
- employment in *education and training* varies little between the five cities varies at 8% or 9%, but these levels have increased since 1996;
- employment in *health care and social assistance* is highest by far in Adelaide at 16% while it is only 12% or 13% in the other cities, and the levels in all cities have increased since 1996;
- there is no variation between the cities in employment in *arts and recreation services* at 4%, and the levels have remained much the same since 1996;
- employment in *other services* has not changed much since 1996 and are at 45 in all the cities;
- there has been a small increase in employment in the *inadequately described/not stated* since 1996, with employment in 2016 being at 3% to 5% across the cities.

Focusing on change in employment across the industry sectors in the five big cities over the decade 2006-2016 (see Table 7), the following dynamics are evident:

- employment in *agriculture/forestry and fishing* was negligible and hardly changes.
- Perth had gains in employment in *mining*;
- there was no change to speak of in employment in *electricity/gas/water and waste services*;
- big losses in manufacturing employment have occurred across all the cities, and especially in Adelaide and Melbourne;

Table 6: Industry Structure of Employment in the Five Big Cities, 2006-2016

	Sydney	Melbourne	Brisbane	Adelaide	Perth	5 capital cities	Rest of Aust
	(%)	(%)	(%)	(%)	(%)	(%)	(%)
Agriculture/forestry & fishing	0	1	1	1	1	1	6
Mining	0	0	1	1	5	1	3
Manufacturing	6	8	7	8	6	7	6
Electricity/gas/ water & waste services	1	1	1	1	1	1	1
Construction	8	8	9	8	10	8	9
Wholesale trade	4	4	3	3	3	3	2
Retail trade	9	10	10	11	10	10	10
Accommodation & food services	7	6	7	7	6	7	8
Transport/postal & warehousing	5	5	6	4	5	5	4
Information media & telecommunications	3	2	1	1	1	2	1
Financial & insurance services	6	4	3	3	3	5	2
Rental/ hiring & real estate services	2	2	2	1	2	2	1
Professional/scientific & technical services	10	9	8	6	7	9	5
Administrative & support services	4	4	4	4	3	4	3
Public administration & safety	5	5	7	8	6	6	8
Education & training	8	9	9	9	9	9	9
Health care & social assistance	12	12	13	16	12	12	13
Arts & recreation services	2	2	2	2	2	2	1
Other services	4	4	4	4	4	4	4
Inadequately described/Not stated	5	5	4	3	5	5	4
Total Employment	100	100	100	100	100	100	100

Source: The authors using data from the ABS (2017) 2016 Census of Population and Housing.

Table 7: Change in Industry Structure of Employment for the Five Big Cities, 2006-2016

	Sydney	Melbourne	Brisbane	Adelaide	Perth	5 capital cities	Rest of Australia
	(pp's)	(pp's)	(pp's)	(pp's)	(pp's)	(pp's)	(pp's)
Agriculture/forestry & fishing	0.0	0.0	0.0	0.1	-0.1	0.0	
Mining	0.0	0.0	0.6	0.2	1.8	0.4	
Manufacturing	-4.0	-5.2	-4.6	-5.3	-4.3	-4.6	
Electricity/gas/water & waste services	-0.1	0.3	0.1	0.2	0.1	0.1	
Construction	1.1	0.8	0.5	1.0	0.9	0.9	
Wholesale trade	-2.0	-2.0	-1.6	-1.1	-1.6	-1.8	
Retail trade	-1.2	-1.2	-1.7	-1.2	-1.7	-1.3	
Accommodation & food services	0.6	0.9	0.7	0.9	0.7	0.7	
Transport/postal & warehousing	-0.3	0.2	0.1	0.0	0.4	0.0	
Information media & telecommunications	-0.2	-0.3	-0.3	-0.3	-0.4	-0.3	
Financial & insurance services	0.0	-0.3	-0.4	-0.6	-0.7	-0.3	
Rental/hiring & real estate services	0.1	0.3	0.0	-0.1	-0.2	0.1	
Professional/scientific & technical services	0.9	0.8	0.7	0.2	-0.1	0.7	
Administrative & support services	0.2	0.0	0.3	0.2	0.0	0.1	
Public administration & safety	-0.1	0.1	0.0	0.6	-0.1	0.0	
Education & training	0.9	1.0	1.3	1.1	1.1	1.0	
Health care & social assistance	1.6	1.9	2.4	2.4	1.7	1.9	
Arts & recreation services	0.2	0.4	0.2	0.2	0.3	0.3	
Other services	-0.2	0.0	0.0	0.0	0.1	-0.1	
Inadequately described/Not stated	2.3	2.2	1.7	1.3	2.0	2.1	
Total Employment	0.0	0.0	0.0	0.0	0.0	0.0	

Source: The authors using data from the ABS (2017) 2016 Census of Population and Housing.

- there were small gains in *construction*, especially in Sydney and Adelaide;
- there were small declines in both *wholesale trade* and *retail trade* across all five cities, with the decline in *wholesale trade* most marked in Sydney and Melbourne;
- there were very small gains in employment in *accommodation and food services*;
- the producer services - such as *information/media and telecommunications, financial and insurance services, rental/hiring and real estate services, and professional/scientific and technical services* - tended to experience very small losses or gains in employment across the cities, with the losses often being slightly more in Brisbane, Adelaide and Perth for some of those producer services;
- there was negligible loss or gain in employment in *administrative and support services* and in *public administration and safety*, except for Adelaide where there was a larger gain in across the cities in the latter;
- all five cities had a gain in employment in *education and training*;
- there were also gains in employment in *health care and social assistance*, especially in Brisbane and Adelaide;
- there were no changes in employment in *arts and recreation services*;
- there were no changes in employment in *other services*;
- all cities had an increase in the incidence of *inadequately described/not stated* category, and that was marked in Sydney and Melbourne.

From the data in Tables 6 and 7, the following are evident:

- the dominant role of Sydney, and to a lesser extent Melbourne, for employment in industry sectors relating to the knowledge/information economy and the producer services sectors which underpins their roles at the nation's leading cities, and, in the case of Sydney its global city role;
- Melbourne and Adelaide continue to be important in manufacturing, even though aggregate employment continues to be in decline, while Perth dominated mining and mining services;
- Adelaide stands out somewhat as a public sector city with its high concentrations of employment in the health and social services and public administration; and
- Brisbane is more of a consumption economy with employment growth in population-serving activities.

4. EXPLAINING DIVERGENT EMPLOYMENT GROWTH AND DECLINE BETWEEN THE FIVE BIG CITIES REGIONS

One of our concerns is to investigate how divergence has been occurring in the employment growth or decline in the five big cities - Sydney, Melbourne, Brisbane, Adelaide and Perth - by focusing on a measure of performance that might be explained by factors that are *endogenous* to the city.

4.1 Using Regional Shift-Share Analysis

Regional SSA was employed to calculate three components of the total shift in employment - *national shift, industry mix, and regional (or differential) shift* effects - for the 10-year period

2006-2016 using the modification developed by Haynes and Dinc (1997). This replicated the approach used by Robson (2011) in an analysis undertaken for the period 1996 - 2006.

In the Haynes and Dinc methodology the total change in employment over a specific time period is referred to as the '*Total Shift*'. As with all SSA techniques, the methodology decomposes the total shift in employment into its *exogenous* and *endogenous* shift effects.

The *exogenous effects* are those effects attributable to both the increase in national employment (known as the '*national shift effect*') and the impact of growth in certain industries nationally (known as the '*industry mix effect*'). Comparatively, the *endogenous shift effect* (known as '*regional*' or '*differential shift effect*') is due to the impact of factors within the local area. This can be shown mathematically in equation 1.

$$Total\ shift = National\ Shift\ Effect + Industry\ Mix\ Effect + Regional\ Shift\ Effect \quad (1)$$

The *national shift effect* is the change in employment in a certain industry that would have taken place in employment had grown at the same rate of that for all industries nationally. It is calculated by multiplying the level of employment in the local area by the growth rate of employment nationally (see equation 2):

$$NS = E_i \times g_n \quad (2)$$

where:

- *NS* is the National Shift effect;
- E_i is the employment in industry 'i' at the initial year, and
- g_n is the growth rate of employment nationally.

The *Industry Mix effect* is the change in employment in a certain industry that would have taken place if it had grown at the same rate as that industry nationally (see equation 3).

$$IM = E_i \times g_{i,n} \quad (3)$$

where:

- *IM* is the Industry Mix Effect;
- E_i is the employment in industry 'i' at the initial year; and
- $g_{i,n}$ is the growth in employment in industry 'i' nationally.

The *Regional Shift effect* (also known as the differential shift effect) is the residual between the total shift and the combination of the national shift effect and the industry mix effect. It can be calculated as either the difference between those three, or more properly as:

$$RS = E_i \times (g_{i,r} - g_{i,n}) \quad (4)$$

where:

- *RS* is the Regional Shift Effect;
- E_i is the employment in industry 'i' at the initial year;
- $g_{i,r}$ is the regional growth rate of employment in that industry; and
- $g_{i,n}$ is the national growth rate of employment in that industry.

A *positive* score on the regional shift effect may be taken as indicative that the region has endogenous characteristics/factors/processes that are enhancing to the region's employment performance over and above that which is due what is happening nationally and is due to industry structure effects. In other words, the region possesses attributes that are giving the region's employment a boost enhancing employment.

Conversely, a *negative* score on the regional shift effect may be taken as indicative that the region possesses characteristics/factors processes that detract from or are detrimental for employment dragging or slowing the region down restricting employment.

For our analysis we used data based on the place of enumeration count methodology. This was because the Australian Bureau of Statistics releases time series data on CD only using this count method for all statistical divisions⁷. For consistency purposes, this is the count method used through the paper. The implications of using this count method is that employment data refer to people who are employed based on where they were counted. As such, a higher level of employment does not necessarily mean an area has more jobs in that area.

4.2 Results

The results of the SSA for the five big cities for the decade 1996-2006 are provided in Tables 8 and 9, while the results of the analysis for the decade 2006-2016 are in Tables 10 and 11. In the discussion that follows we focus on the *Regional Shift effect*, which is a *surrogate measure* for the *endogenous regional employment performance* for each of the cities. We highlight:

- (a) differences between the cities; and
- (b) changes for each of the cities over the two successive 10-year time periods.

4.2.1 Endogenous regional employment performance for 1996-2006

Between 1996 and 2006 (see Table 8), in aggregate the five cities recorded *negative regional shift effects* in employment of almost +16,000 jobs or +1 job per 100 increase in working age population. However, during that time the regional areas of Australia experienced a *positive* regional shift effect of almost +16,000 or +3 jobs per 100 increase in working age population.

Most of the *positive* regional shift effect experienced by the combined five big cities for the period 1996-2006 was attributable to Sydney, which had a *negative regional shift effect* of -113,034 or -37 jobs per 100 increase in working age population. Adelaide had a much smaller *negative* regional shift effect of -17,193 jobs or -37 per 100 increase in working age population.

In contrast, *positive* regional shift effects were recorded in Brisbane (+66,832 or +29 jobs per 100 increase in working age population), Melbourne (+22,948 or +7 jobs per 100 increase in working age population), and Perth (+24,714 or +17 jobs per 100 increase in working age population).

⁷ Place of usual residence method is available for most statistical division. This data needs to currently be downloaded one statistical division at a time-consuming a significant amount of time to download all the required data. For most Statistical Divisions there is little difference between the two count methodologies. On balance, I determined that the place of enumeration count method was the optimal count method to use at this point in time.

Table 8: Shift-Share Analysis Results for the Five Big Cities for 1996-2006

	Total shift		National Shift effect		Industry Mix effect		Regional Shift effect	
	(no.)	Per 100 increase in working age population (no.)	(no.)	Per 100 increase in working age population (no.)	(no.)	Per 100 increase in working age population (no.)	(no.)	Per 100 increase in working age population (no.)
Sydney	219,197	72	322,080	106	10,126	3	-113,034	-37
Melbourne	286,066	87	267,520	82	-4,412	-1	22,948	7
Brisbane	202,382	89	126,212	56	9,366	1	66,832	29
Adelaide	68,374	146	83,925	180	1,638	4	-17,193	-37
Perth	139,700	96	106,380	73	8,598	6	24,714	17
Australia	1,467,862	94	1,467,941	94	—	—	—	—
5-capital cities	915,719	87	906,064	86	25,323	2	-15,668	-1
Rest of Australia	552,143	107	561,798	109	-25,323	-5	+15,668	+3

Source: Robson (2011) using data from the ABS (2007) 2006 Census of Population and Housing.

Table 9: Regional Shift Effects for the Five Big Capital Cities, 1996-2001, 2001-2006, and 1996-2006

	1996-2006		1996-2001		2001-2006	
	(no.)	Per 100 increase in working age population (no.)	(no.)	Per 100 increase in working age population (no.)	(no.)	Per 100 increase in working age population (no.)
Sydney	-113,034	-37	-13,336	-7	-98,021	-85
Melbourne	22,948	7	27,475	17	-8,532	-5
Brisbane	66,832	29	14,133	14	51,436	40
Adelaide	-17,193	-37	-8,604	-39	-7,945	-32
Perth	24,714	17	3,665	5	19,419	26
Australia	—	—	—	—	—	—
5-capital cities	-15,668	-1	23,333	4	-43,643	-9
Rest of Australia	+15,668	3	-23,333	-10	43,643	16

Note: Regional Shift for 1996-2006 does not sum for the periods of 1996-2001-11 and 2006-2006 due to compounding effect.

Source: Robson (2011) using data from the ABS (2007) 2006 Census of Population and Housing.

Table 10: Shift-Share Analysis Results for the Five Big Capital Cities, 2006-2016

	Total shift		National Shift effect		Industry Mix effect		Regional Shift effect	
	(no.)	Per 100 increase in working age population (no.)	(no.)	Per 100 increase in working age population (no.)	(no.)	Per 100 increase in working age population (no.)	(no.)	Per 100 increase in working age population (no.)
Sydney	369,189	83	330,279	75	-2,200	0	41,110	9
Melbourne	403,607	74	297,027	54	-26,353	-5	132,933	19
Brisbane	174,068	68	156,108	61	160	0	17,800	7
Adelaide	52,440	72	92,761	127	-5,091	-7	-35,230	-48
Perth	190,623	69	126,587	46	15,651	6	48,385	18
Australia	1,579,656	71	1,579,656	71	—	—	—	—
5-capital cities	1,189,927	75	1,002,762	63	-17,812	-1	204,977	13
Rest of Australia	389,729	79	576,894	117	+17,812	4	-204,977	-42

Source: The authors using data from the ABS (2017) 2016 Census of Population and Housing.

Table 11: Regional Shift Effects for the Five Big Capital Cities for 2006-2011, 2011-2016, and 2006-2016

	2006-2016		2006-2011		2011-2016	
	(no.)	Per 100 increase in working age population (no.)	(no.)	Per 100 increase in working age population (no.)	(no.)	Per 100 increase in working age population (no.)
Sydney	41,110	9	-39,142	-22	81,134	30
Melbourne	132,933	24	46,056	19	67,667	23
Brisbane	17,800	7	14,864	10	312	0
Adelaide	-35,230	-48	-13,855	-30	-25,636	-94
Perth	48,385	18	37,992	25	9,228	7
Australia	—		—		—	
5-capital cities	204,977	13	45,916	6	132,705	16
Rest of Australia	-204,977	-42	-45,916	-15	-132,705	-75

Note: Regional Shift for 2006-2016 does not sum for the periods of 2006-11 and 2011-16 due to compounding effect.

Source: The authors using data from the ABS (2017) 2016 Census of population and Housing.

As explained by Robson (2011), from the data in Table 9 – which segments the analysis into the two intercensal periods 1996-2001 and 2001-2006 that comprised the period 1996-2006 – the following are evident in their regional shift effect for the cities:

- Most of Sydney’s *negative* regional shift effect over the decade 1996-2006 occurred in the second five years (i.e. 2001 to 2006) when there was a most substantial noticeable acceleration in the *negative* regional shift effect from -7 jobs per 100 increase in working age population to -85 jobs. Was that some sort of post-the 2000 Olympic effect?
- Melbourne recorded a *positive* regional shift effect in the period 1996-2001 of +17 jobs per 100 increase in working age population, but that was followed by a *negative* regional shift effect of -5 jobs per 100 increase in working age population.
- Adelaide’s regional shift effect over the decade 1996-2006 was *negative*, but marginally less *negative* in the later period (2001-2006) at -32 jobs per 100 increase in working age population compared with -37 jobs per 100 increase in population in the period 1996-2001.
- Both Brisbane and Perth recorded accelerating *positive* regional shift effects over both components of the decade 1996-2006:
 - for Brisbane the *positive* effect was +14 jobs per 100 increase in working age population in the 1996-2001 period and that accelerated to +40 jobs in the 2001-2006 period; and
 - for Perth the *positive* effect was +5 jobs per 100 increase in working age population in the period 1996-2001 which accelerated to +26 jobs in the period 2001-2006 period, which was probably associated with the onset of the resources boom.

4.2.2 Endogenous Regional Employment Performance for 2006-2016

The data in Table 10 shows that over the 10 years 2006 to 2016 across the five big cities combined there was a *positive* regional shift effect of almost +250,000 jobs or +13 jobs per 100 increase in working age population. Note that in contrast, the regional areas of Australia experienced a *negative* regional shift performance over the decade 2006-2016.

The turn-around from a *negative* regional shift performance for the combined five big cities over the 10-year period 1996-2006 to a *positive* regional shift performance for the 10-year period 2006-2016 was due to a rebound from *negative* to *positive* regional shift performance in Sydney with a gain of more than +41,000 jobs or +9 jobs per 100 increase in working age population. But the big driver of the *positive* regional shift effect was the strong *positive* performance of Melbourne with a gain of almost +133,000 jobs or +19 jobs per 100 increase in working age population. In addition, Perth had a substantial *positive* performance with a gain of more than +48,000 jobs or +18 jobs per 100 increase in working age population, while Brisbane also had a *positive* regional shift performance with a gain of almost +18,000 jobs or +7 jobs per 100 increase in working age population.

In contrast, Adelaide continued to experience a *negative* regional shift effect of -35,230 jobs or a loss of -48 jobs per 100 increase in working age population.

The *endogenous* regional employment performance for the five big cities for the decade 2006-2016 was segmented into the two intercensal periods 2006-2011 and 2011-2016. The period 2006-2011 encompassed the economic shock of the CGF - even though Australia did not go into a technical recession - and the subsequent beginning of the recovery, while the period 2011-2016 saw the end of the resources boom. The results are shown in Table 11.

The following dynamics are evident in the regional shift performance of the five big cities:

- For the first part of the decade 2006-2016, between 2006 and 2011 Sydney recorded a weak *negative* performance, but for the next five years from 2011 to 2016 that turned to be *positive*. Even so, for the whole of the ten-year period the performance was a *positive* +30 jobs per 100 increase in working age population.
- Melbourne was the stand out city with a reasonably strong *positive* regional shift performance which in fact strengthened in the second period 2011-2016 when it was +19 jobs per 100 increase in working age population.
- Brisbane too has a *positive* regional shift performance across both halves of the decade 2006-2016 with 10 jobs added per 100 increase in working age population from 2011 to 2016.
- In Perth there also was a particularly strong *positive* regional shift performance and that increased from +18 jobs per 100 increase in working age population from 2006 to be 2011 to +25 per 100 increase in working age population and that performance was despite the end of the resources boom.
- It was only Adelaide where there was a *negative* regional shift performance across both halves of the decade at *negative* -48 jobs per 100 increase in work age population from 2006 to 2011 and negative -30 jobs per 100 increase in working age population.

5. INDUSTRIAL EXPLANATIONS FOR THE ENDOGENOUS REGIONAL EMPLOYMENT PERFORMANCE OF THE FIVE BIG CITIES

It is important to dig further into the *endogenous* regional employment performance of the five big cities by analysing what has been happening for key industry sectors in each of cities. This is examined both for the period 1996-2006 and for the period 2006-2016.

5.1 The period 1996 to 2006

In his analysis for the 10-year period 1996-2006, Robson (2011) found that the industries mainly affecting regional shift effects in the five big cities in aggregate were:

- *manufacturing* (particularly for Sydney and Melbourne); and
- *construction* (particularly for Sydney).

The large *negative* regional shift effect of *manufacturing* employment in Sydney and Melbourne, and to a lesser degree Adelaide, was countered by *positive* regional shift effects in, Brisbane and Perth, and a *positive* regional shift effect also occurred across regional Australia.

Proportionate to their 1996 employment levels, the *mining* industry recorded large regional shift effects during the period that included the onset of the resources boom. Sydney and Melbourne recorded strong *negative* proportionate regional shift effects, while Perth, Adelaide and Brisbane recorded strong proportionate regional shift effects.

Other proportionately large regional shift effects were recorded in *electricity gas and water supply* for Brisbane (*positive*), *construction* for Sydney (*negative*), and *arts and recreation services* for Adelaide (*negative*).

For all the five big cities in aggregate, over the period 1996 to 2006 most of the *negative* regional shift effects were concentrated in:

- *manufacturing* with almost -21,000 jobs or more than the total *negative* regional shift effect;

- *construction* with -7,470 jobs or 48% of the total *negative* regional shift effect; and
- *administrative and support services* with more than- 6,000 jobs or 39% of total *negative* regional shift effects jobs.

The highest *positive* regional shift effects were recorded in:

- the *wholesale trade* industry with +8,630 jobs;
- the *mining* industry with almost +6,400 jobs; and
- *financial and insurance services* with more than 6,000 jobs.

Proportionately, compared with 1996 employment levels, over the ten years to 2006, the highest *positive* regional shift effect was in the *mining* industry at a +32% gain in jobs, followed by the *electricity, gas and water supply industry* at a +6% gain in jobs. The highest *negative* proportionate regional shift effects over this period were recorded in *agriculture, forestry and fishing* with a -8% loss in jobs, and *administrative and support services* with a -4% loss in jobs.

Robson's (2011) analysis for the period 1996-2006 found that the *endogenous* employment performance in the industry sectors certainly varied between the five big cities:

- the regional shift effect in *agriculture/forestry and fishing* was negligible in all the cities;
- Perth had a strong *positive* regional shift effect in *mining*;
- the regional shift effect for *electricity/gas/water and waste services* was slightly *negative* in Sydney, and slightly *positive* in the other cities;
- there was a marked *negative* regional shift effect for *manufacturing* in Sydney and Melbourne while it was *positive* in Brisbane and Perth;
- only for Sydney was there a *negative* regional shift effect for *construction*, while it was *positive* for the other cities;
- Melbourne had a strong *positive* regional shift effect for *wholesale trade* but it was *negative* in Adelaide;
- the regional shift effect for *retail trade* was markedly *negative* in Sydney, but it was distinctly *positive* in Melbourne and Brisbane;
- the regional shift effect for *accommodation and food services* was also *negative* in Sydney, but it was again *positive* in Melbourne and Brisbane;
- for transport/postal and warehousing the regional shift effect was *negative* in Sydney and *positive* in Melbourne and Brisbane;
- in the producer services industry sectors - including *information/media and telecommunications, financial and insurance services, rental/hiring and real estate services, and professional/scientific and technical services* - the regional shift effects tended to be small but *positive*, especially in Sydney and Melbourne, except for a *negative* regional shift effect for a *negative* performance for *professional/scientific and technical services* in Sydney;
- the regional shift effect for *administrative and support services* was markedly *negative* in Sydney, but *positive* in Melbourne and Brisbane;
- Sydney and Melbourne had a pronounced *negative* regional shift effect for *public administration and safety*, while it was *positive* in Brisbane, Adelaide and Perth;

- the regional shift effect for *education and training* was *negative* in Sydney and Adelaide, but it was *positive* in the other cities;
- the regional shift effect for *health care and social assistance* was markedly *negative* in Sydney but less so in Adelaide, while it was positive in the other cities;
- the regional shift effect for arts and recreation services tended to be small (positive or negative) in all the cities; and
- the regional shift effect for the *other services* category was slightly *negative* in Sydney, Melbourne and Adelaide, and slightly *positive* in Brisbane and Perth.

5.2 The period 2006-2016

We have replicated that 1996-2016 analysis for the subsequent ten-year period 2006 to 2016. The results are shown in Table 12.

The data reveal that the in aggregate for the five big cities the largest *negative* regional shift effect was for *manufacturing* at -4,705 jobs - thus continuing the long-standing decline in manufacturing employment in the big cities - with *negative* performance also being in the *administrative and support services* at almost -4,000 jobs.

But in marked contrast there was substantial *positive* regional shift effect for:

- *construction* (almost +30,000 jobs);
- *retail trade* (almost +26,000 jobs);
- *accommodation and food services* (almost +26,000 jobs);
- *education and training* (+19,000 jobs); and
- *public administration and safety* +13,000 jobs).

There was also *positive* performance on the regional shift effect by these industry sectors that relate to producer services:

- *financial and insurance services*;
- *rental/hiring and real estate services*;
- *professional/scientific and technical services*;
- *information/media and telecommunications*; and
- *transport/postal and warehousing*.

In addition, there was positive performance for *arts and recreation services* and also in *agriculture/forestry and fishing* and in *mining*.

The biggest contributors to the regional shift effect for the five big cities combined were the population-serving service sectors, including *construction*, *retail trade*, *accommodation and food services* and *health care and social assistance*, and in *construction*.

Proportionately, compared with 2006 employment levels, over the ten years to 2006, the highest *positive* regional shift effect by far was in *agriculture/forestry and fishing*, *information/media and telecommunications*, and *retail trade*. It was also substantial for *financial and insurance services*; *rental/hiring and real estate services*; *transport/postal and warehousing*; *accommodation and food services*; *electricity/gas/ water and waste services*; *construction*; and *public administration and safety*.

Table 12: Regional Shift Effects in the Five Big Cities for 2006-2016

	Total Shift	Regional Shift Effect	Contribution to Total Region Shift	Regional Shift c.f. 2006 Employment Level
	(no.)	(no.)	(%)	(%)
Agriculture\ forestry & fishing	8,235	10,170	5.0	123
Mining	34,330	9,137	4.5	27
Manufacturing	-187,023	-4,705	-2.3	3
Electricity\ gas\ water & waste services	18,224	3,448	1.7	19
Construction	153,333	29,746	14.5	19
Wholesale trade	-63,819	1,777	0.9	-3
Retail trade	38,435	25,615	12.5	67
Accommodation & food services	121,067	25,728	12.6	21
Transport\ postal & warehousing	60,576	12,554	6.1	21
Information media & telecommunications	8,045	5,987	2.9	74
Financial & insurance services	37,520	8,621	4.2	23
Rental\ hiring & real estate services	26,065	7,506	3.7	29
Professional\ scientific & technical services	142,200	8,948	4.4	6
Administrative & support services	49,560	-4,922	-2.4	-10
Public administration & safety	71,435	13,173	6.4	18
Education & training	161,663	19,080	9.3	12
Health care & social assistance	256,014	5,708	2.8	2
Arts & recreation services	37,168	4,237	2.1	11
Other services	40,844	1,482	0.7	4
Inadequately described/Not stated	176,057	21,708	106	12
Total Employment	1,189,927	204,998	100.0	17

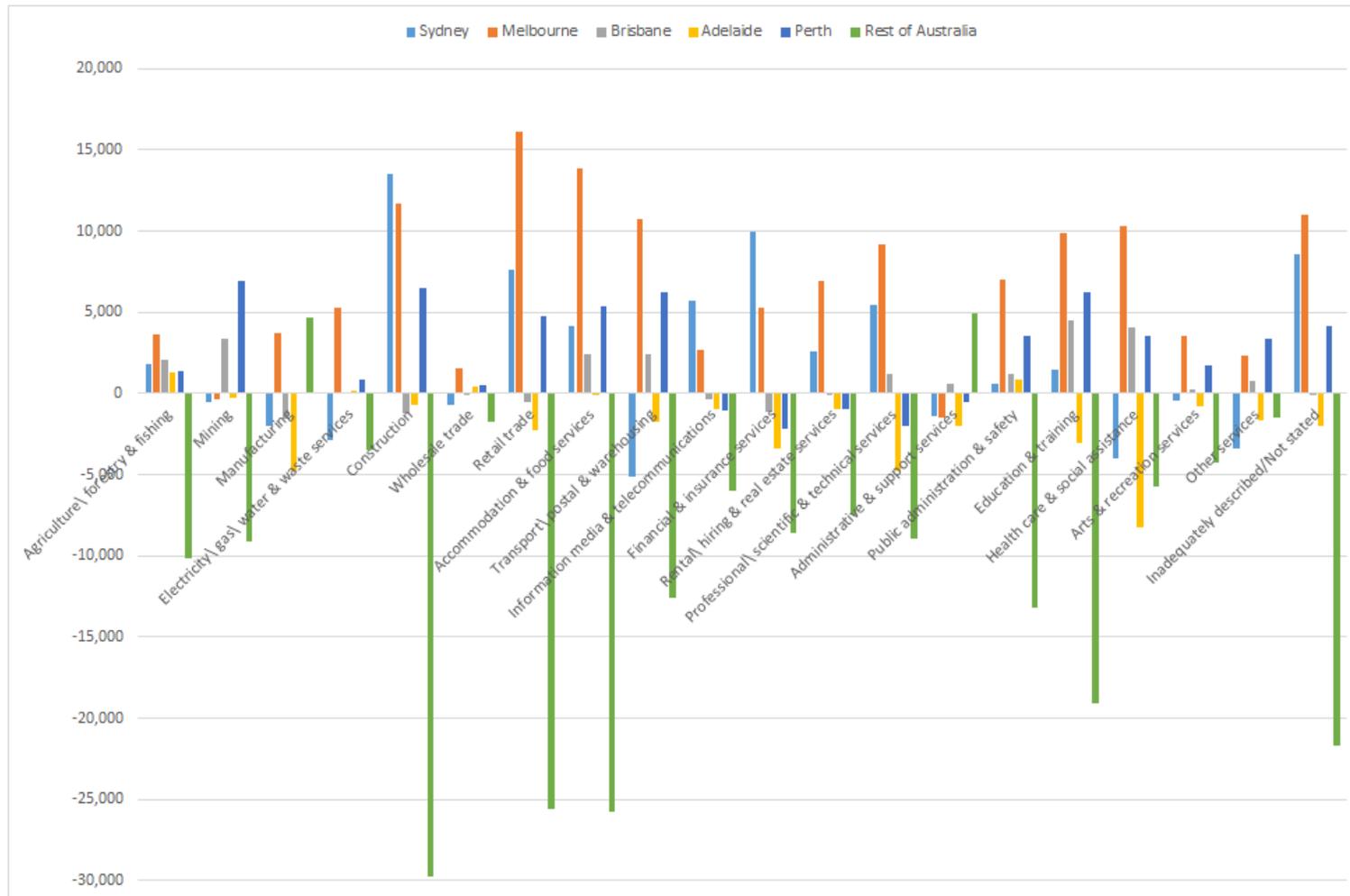
Source: The authors using data from the ABS (2017) 2016 Census of Population and Housing.

The regional shift effects for the 10 years 2006 to 2016 for industry sectors were certainly not even across the five big cities. The regional shift effects in those industry sectors for Sydney, Melbourne, Brisbane, Adelaide and Perth, plus for the rest of Australia, are shown in Figure 1.

From that figure the following findings may be highlighted:

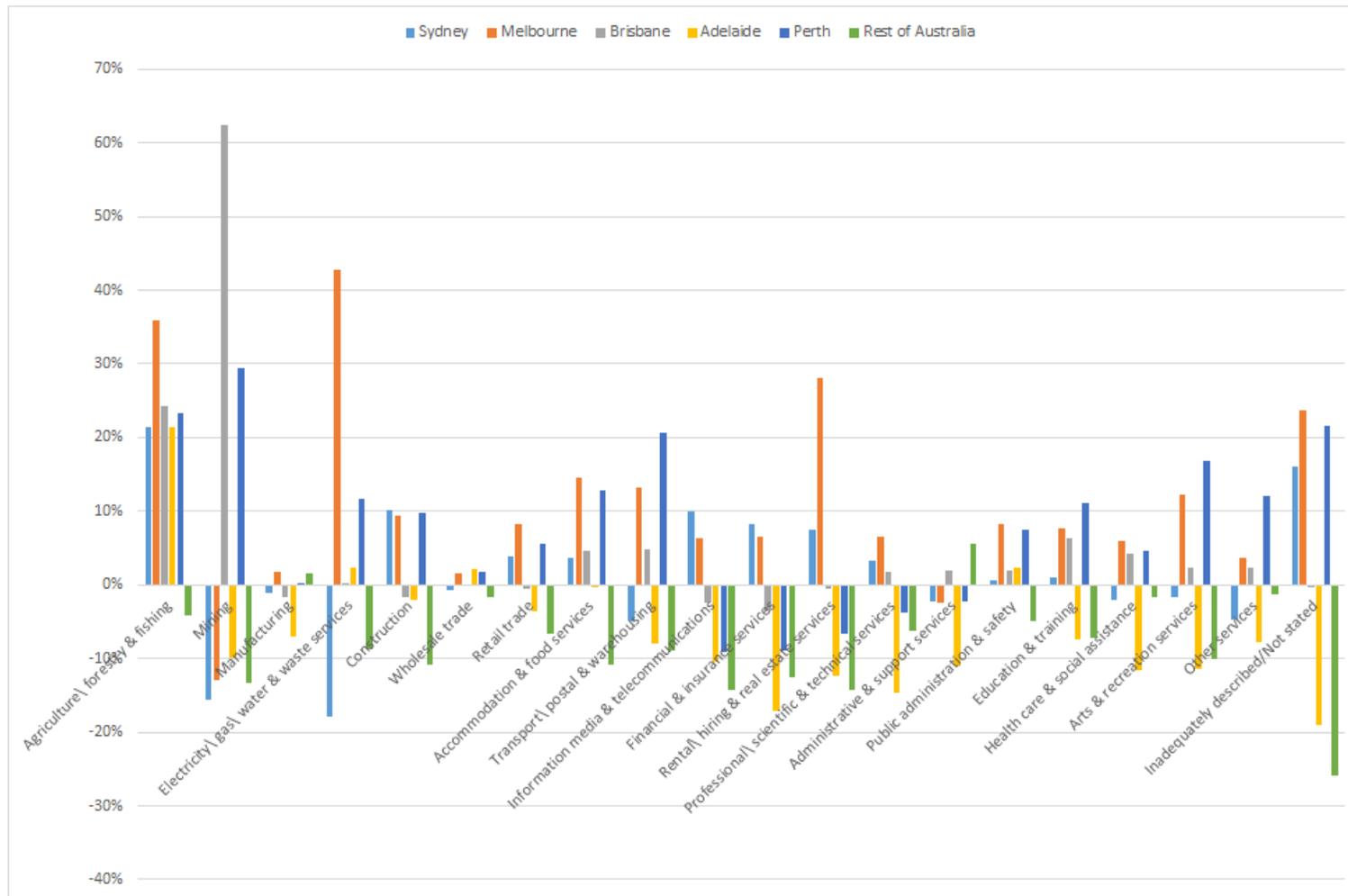
- all cities have a small *positive* regional shift effect for *agriculture/forestry and fishing*;
- Perth stands out as the city with the greatest *positive* regional shift effect for *mining*;
- Melbourne was the only city with a *positive* effect for *manufacturing* - but so did the rest of Australia - while Adelaide's performance was markedly *negative* reflecting substantial jobs losses in the automotive industries;

Figure 1: Regional Shift Effect by Industry for the Five Big Cities, 2006-2016



Source: The authors, using data derived from the ABS (2017) 2016 Census of Population and Housing.

Figure 2: Regional Shift Effect as a Proportion of 2006 Employment Levels by Industry for the Five Big Cities



Source: The authors, using data derived from the ABS (2017) 2016 Census of Population and Housing.

- Sydney, Melbourne and Perth stand out for their *positive* performance in *construction* employment;
- Melbourne in particular - but also Sydney and Perth - had strong *positive* performance for *retail trade* jobs, while this was *negative* in Adelaide;
- all the cities had *positive* performance for employment in *accommodation and food services* with Melbourne the stand-out performer;
- performance in *transport/postal and warehousing* was *negative* in Brisbane and Adelaide while it was strongly *positive* in Melbourne;
- performance in *information/media and telecommunications* was *positive* in Sydney and Melbourne but *negative* elsewhere, and that was repeated for *financial and insurance services* and *retail/hiring and real estate services*, but for *professional/scientific and technical services* Brisbane joined Sydney and Melbourne with a *positive* employment performance;
- only in Brisbane was there a very small *positive* regional shift effect for *administrative support services* employment, while in the other cities it was *negative*;
- for *public administration and safety* employment there was a *positive* regional shift effect and that was most marked in Melbourne and Perth;
- only for Adelaide was there a *negative* regional shift effect for employment in education and training and the positive effect was particularly strong in Melbourne;
- Melbourne, Brisbane and Perth had a positive regional shift effect for employment in *health care and social assistance* while the effect was *negative* for the other cities and especially in Adelaide;
- for employment in *arts and recreation services* there was a *positive* regional shift effect in Melbourne and Perth but less so for Brisbane, while it was *negative* in Sydney and Adelaide; and
- for the *other services* category Sydney and to a lesser extent Adelaide had a *negative* regional shift effect while it was *positive* in the other cities.

Figure 2 plots the regional shift effects in the five cities for 2006-2016 as a proportion of 2006 employment levels for industry sectors. There were major differences between the five big cities in those proportions for industry sectors. For example:

- for all the cities the proportionate gain was quite a large for employment in agriculture/forestry and fishing;
- the proportionate gain figure was particularly high for employment in mining in Brisbane and to a lesser extent in Perth, but there was a proportionate loss for the other cities;
- Melbourne had the largest (but still relatively small) proportionate loss for employment in mining;
- the proportionate *gain* was high in Melbourne for employment in *electricity/gas/water and waste services* while Sydney had a proportionate *loss*;
- Sydney, Melbourne and Perth had small proportionate *gains* for *construction* jobs;

- there were *negligible* proportionate changes for employment in *wholesale trade* employment in all the cities;
- Adelaide has a small proportionate *loss* for *retail trade* employment while there were small *gains* in Melbourne, Perth and Sydney;
- the small *gains* were most evident in Melbourne and Perth for employment in *accommodation and food services*;
- Melbourne was the clear leader for a *gain* in employment in *transport/postal and warehousing* while there were small proportionate *losses* in Adelaide and Sydney;
- for the producer services industries - including *information/media and telecommunications, financial and insurance services, rental/hiring and real estate services, and professional/scientific and technical services* - it was Melbourne, and Sydney that had generally strong proportionate *gains* while the other cities generally had proportionate *losses*, and that was especially so for Adelaide;
- for employment in *administrative and support services* there was a marked proportionate *loss* in Adelaide, but that *loss* was smaller in Perth, while the other cities had small proportionate *gains*;
- for employment in *public administration and safety* there the largest if small proportionate *gains* occurred in Melbourne and Perth;
- for employment in *education and training* and in *health care and social assistance* Adelaide had a proportionate *loss* while the other cities tended to have small proportionate *gains*, especially for Melbourne and Perth;
- Melbourne and Perth had the highest if small proportionate *gains* for employment in *arts and recreation services* while there was a loss in Adelaide; and
- for employment in other services there was a small proportionate *loss* for Sydney and Adelaide, while there was a somewhat marked *gain* for Perth.

6. THE ENDOGENOUS REGIONAL EMPLOYMENT PERFORMANCE FOR INDUSTRY SECTORS IN THE FIVE BIG CITIES

We now turn the focus on each of the five big cities in turn to highlight each city's endogenous regional employment performance for the various industry sectors and how that might have changed over time between across for the successive ten-year periods 1996-2006 (using the data generated from the analysis conducted by Robson, 2011) and 2006-2016 (using the data generated from the analysis conducted for this paper). The performance for each city is examine in turn.

6.1 Sydney

6.1.1 Performance 1996-2006

For employment across all the industry sectors combined for the period 1996-2006, Sydney was the city with the largest *negative* regional shift effect.

Robson's analysis showed that nearly two-thirds of the *negative* regional shift effect of almost -113,000 was attributable to jobs losses in four industries:

- *manufacturing* (almost -23,000 jobs or 20% of total region shift effect);
- *construction* (more than -23,000 jobs or 20% of total region shift effect);

- *retail trade* (more than -14,000 jobs or 13% of total region shift effect); and
- *health care and social assistance* (more than -12,000 jobs or 11% of total region shift effect).

Despite that *negative* performance, there were three industry sectors with a *positive* regional shift effect. They were:

- *financial and insurance services* (almost +3,500 jobs or 3% of total regional shift effect);
- *information, media and telecommunications* (almost +2,800 jobs or 2% of total region shift effect); and
- *wholesale trade* (+500 jobs or less than 1% of total region shift effect).

Proportionately, compared with 1996 employment levels, the highest *negative* regional shift effect in Sydney was for loss of jobs in the *mining* industry (a -33% *loss* in jobs), followed by the *construction* industry (a -22% *loss* in jobs), and the *administrative and support services* (a -17% *loss* in jobs). The highest *positive* regional shift was for *gains* jobs in *information, media and telecommunications* (a +5% *gain* in jobs), followed by *financial and insurance services* (a +3% *gain* in jobs), and *wholesale trade* (less than a +1% *gain* in jobs).

6.1.2 Performance 2006-2016

Table 13 shows the results of the analysis of the regional shift effects for the industry sectors in Sydney for the 10-year period 2006-2016.

The regional shift effect across all industry sectors combined for Sydney was *positive*. The enhancing endogenous employment performance of that city was some +41,000 jobs, which was around 11% of the total employment growth of almost 369,200 over the 10-year period 2006-2016. That turned around what had been a *negative* performance for the previous 10-year period 1996-2006, which was a significant reversal. That *positive* performance for 2006-2016 was attributable mainly to the *positive* endogenous performance by the following industry sectors:

- *construction* (more than +13,500 jobs or one-third of total regional shift effect);
- *financial and insurance services* (almost +10,000 jobs or 24% of the total regional shift effect);
- *retail trade* (more than +7,600 jobs or 19% of the total regional shift effect);
- *information/media and telecommunications* (+5,700 jobs or 14% of the total regional shift effect);
- *professional/scientific and technical services* (more than +5,400 jobs or 13% of the total regional shift effect); and
- *accommodation and food services* (almost +4,200 jobs or 10% of the total regional shift effect).

It is notable that the producer services industries were important contributors to Sydney's *positive* endogenous regional employment performance over this 10-year period which encompassed the GFC, followed by the post-GFC recovery.

There were, however, six industries that had a *negative* regional shift effect in Sydney, the main ones being:

- *transport/postal and warehousing* (-5,200 jobs or 12% of the total regional shift effect); and
- *health care and social services* (-4,00 jobs or 10% of the total regional shift effect).

Proportionately, compared with 2006 employment levels, the highest *positive* employment gains were for *gains* in jobs that were *inadequately described/not stated* (a *gain* in jobs of +16%). There were also *gains* in jobs for *construction* (+10%), *information/media and telecommunications* (a +10% *gain* in jobs), *financial and insurance services* (a +8% *gain* in jobs), and *rental/hiring and real estate services* (a +7% *gain* in jobs).

The highest proportionate *negative* employment losses were for jobs in *electricity/gas/water and waste services* (a *loss* in jobs of -16%) and *mining* (a -16% *loss* in jobs).

Table 13: Regional Shift Effects in Sydney, 2006-2016

	Total Shift	Regional Shift Effect	Contribution to Total Regional Shift	Regional Shift c.f. 2006 Employment Level
	(no.)	(no.)	(%)	(%)
Agriculture\ forestry & fishing	1,401	1,825	4	21
Mining	1,603	-494	-1	-16
Manufacturing	-54,145	-2,006	-5	-1
Electricity\ gas\ water & waste services	1,824	-2,860	-7	-18
Construction	51,706	13,549	33	10
Wholesale trade	-24,382	-714	-2	-1
Retail trade	11,611	7,616	19	4
Accommodation & food services	36,808	4,184	10	4
Transport\ postal & warehousing	12,063	-5,122	-12	-5
Information media & telecommunications	6,567	5,701	14	10
Financial & insurance services	22,621	9,994	24	8
Rental\ hiring & real estate services	9,060	2,609	6	7
Professional\ scientific & technical services	54,360	5,425	13	3
Administrative & support services	16,497	-1,418	-3	-2
Public administration & safety	18,747	592	1	1
Education & training	46,135	1,473	4	1
Health care & social assistance	74,131	-4,012	-10	-2
Arts & recreation services	10,260	-448	-1	-2
Other services	9,594	-3,359	-8	-5
Inadequately described/Not stated	62,723	8,573	21	16
Total Employment	369,184	41,106	100	2

Source: The authors, using data from the ABS (2017) 2016 Census of Population and Housing.

6.2 Melbourne

6.2.1 Performance 1996-2006

In contrast to Sydney, over the 10-year period 1996 to 2006 across all industry sectors combined Melbourne had a modest *positive* regional shift effect of almost +23,000 jobs compared with a total shift in employment of more than +286,000 jobs.

The analysis by Robson (2011) found that most of the *positive* regional shift effect was attributable to the *positive* performance of three industries:

- *wholesale trade* (almost +11,000 jobs or 48% of the of total region shift effect);
- *accommodation and food services* (almost +6,500 jobs or 28% of total regional shift effect); and
- *health care and social assistance* (more than +5,350 jobs or 23% of total regional shift effect).

Along with Sydney, in Melbourne there was a very large *negative* regional shift effect in the *manufacturing* industry (approaching -22,000 jobs). Other industries which recorded a *negative* regional shift effect were:

- *public administration and safety* (almost -4,000 jobs or 17% of total regional shift effect);
- *other services* (-2,700 jobs or 12% of total regional shift effect);
- *mining* (almost -1,000 jobs or 4% of total regional shift effect); and
- *agriculture, forestry and fishing* (-820 jobs or of 4% total regional shift effect).

Proportionately, compared with 1996 employment levels, the *wholesale trade* and *the rental, hiring and real estate services* industries recorded the highest *positive* regional shift effect with a +13% *gain* in jobs, followed by the *electricity, gas and water supply* and the *arts and recreation services* industry all at a +10% *gain* in jobs.

The highest *negative* proportionate regional shift effects were recorded in the *mining* industry with a -33% *loss* of jobs, followed by *agriculture, forestry and fishing* with a -11% *loss* of jobs, and *manufacturing* with a -9% *loss* of jobs.

6.2.2 Performance 2006-2016

Table 14 shows the results of the analysis of the regional shift effects for industry sectors in Melbourne for the 10-year period 2006-2016.

Across all industry sectors combined, for the period 2006-2016 Melbourne had a strong *positive* regional endogenous employment performance with the regional shift effect being +133,000, which accounted for 33% of the total employment gain of nearly 404,000. Its positive performance was the highest of the big cities. That continued its *positive* performance over the previous 10-year period.

The main contributors to Melbourne's *positive* endogenous regional employment performance for 2006-2016 were the following industry sectors which had strong *positive* performance themselves:

- *retail trade* (+16,000 jobs or 12% of total regional shift effect);
- *accommodation and food services* (almost +13,900 jobs or 10% of total regional shift);
- *construction* (more than 11,700 jobs or 9% of total regional shift);
- *transport/postal and warehousing* (almost +10,800 jobs or 8% of total regional shift);
- *health care and social assistance* (almost 10,300 jobs or 8% of total regional shift);
- *education and training* (almost +10,000 jobs or 7% of total regional shift); and
- *public administration and safety* (almost +7,000 jobs or 5% of total regional shift).

The only industry sector with a *negative* regional shift effect for 2006-2016 was *administrative and support services*, but that was negligible.

Table 14: Regional Shift Effects in Melbourne, 2006-2016

	Total Shift	Regional Shift Effect	Contribution to Total Regional Shift	Regional Shift c.f. 2006 Employment Level
	(no.)	(no.)	(%)	(%)
Agriculture\ forestry & fishing	3,163	3,670	3	36
Mining	1,562	-382	0	-13
Manufacturing	-58,517	3,705	3	2
Electricity\ gas\ water & waste services	8,941	5,301	4	43
Construction	47,443	11,724	9	9
Wholesale trade	-19,488	1,535	1	2
Retail trade	19,964	16,090	12	8
Accommodation & food services	41,084	13,863	10	14
Transport\ postal & warehousing	24,363	10,759	8	13
Information media & telecommunications	3,319	2,670	2	6
Financial & insurance services	13,706	5,318	4	7
Rental\ hiring & real estate services	11,496	6,958	5	28
Professional\ scientific & technical services	50,008	9,183	7	6
Administrative & support services	15,180	-1,507	-1	-2
Public administration & safety	21,534	6,993	5	8
Education & training	52,462	9,907	7	8
Health care & social assistance	81,254	10,285	8	6
Arts & recreation services	14,661	3,507	3	12
Other services	13,597	2,310	2	4
Inadequately described/Not stated	57,871	11,035	8	24
Total Employment	403,603	132,926	100	8

Source: The authors, using data from the ABS (2017) 2016 Census of Population and Housing.

Thus, Melbourne's *positive* endogenous regional employment performance over the 10 years 2006-2016 seemed to be firmly driven by the population serving services and by construction.

Proportionately, compared with 2006 the industries with the highest gains in employment were electricity/gas/water and waste services (a gain of +43%), agriculture/forestry and fishing (+36%), rental/hiring and real estate services (+26%), accommodation and food services (+14%), transport/postal and warehousing (+13%), health care and social assistance (+12%).

All the other industries also had proportionate *gains* in jobs over the 10 years 2006-2016, except for *mining* where there was a -13% proportionate *loss* in jobs.

6.3 Brisbane

6.3.1 Performance 1996-2006

Over the 10 years from 1996 to 2011, over all industry sectors combined, Brisbane recorded a strong *positive* regional shift effect of almost +67,000 jobs compared with a total shift in employment of almost +203,000 jobs.

Robson's analysis (2011) showed that most of that strong *positive* regional shift effect was attributable to the *positive* performance of three industries:

- *manufacturing* (almost +16,400 jobs or 25% of total regional shift effect);
- *health care and social assistance* (more than +6,600 jobs or 10% of total regional shift effect); and
- *retail trade* (more than +6,200 jobs or 9% of total regional shift effect).

There was a *negative* regional shift effect recorded in:

- the *information, media and telecommunications* industry (-360 jobs or -1% of total regional shift effect); and
- *agriculture, forestry and fishing* (-110 or less than -1% of total regional shift effect).

Proportionately, compared with 1996 employment levels, the *electricity, gas and water supply* industry had the highest *positive* regional shift effect at a 48% *gain* in jobs, followed by *mining* at a *gain* of 38%, and *manufacturing* at a *gain* in jobs of 22%.

There were *negative* proportionate regional shift effects in the *agriculture, forestry and fishing industry* with a *loss* in jobs of -3% and in *information, media and telecommunications* at a *loss* in jobs of -2%.

6.3.2 Performance 2006-2016

Table 15 shows the results of the analysis of the regional shift effects for Brisbane over the 10-year period 2006-2016. Across all the industry sectors combined the endogenous regional employment performance of Brisbane was *positive* generating +17,800 job which accounted for 10% of the 174,000-plus total jobs growth over the 10-year period 2006-2016.

The main industry sector contributors to that *positive* regional shift effect in Brisbane were:

- *education and training* (+4,530 or 25% of total regional shift effect);
- health care and social assistance (+4,100 or 23% of total regional shift effect);
- *mining* (almost +3,400 jobs or 19% of the total regional shift effect);
- *accommodation and food services* (+2,400 jobs or 14% of total regional shift effect);
- *transport/postal and warehousing* (+2,400 jobs or 14% of total regional shift effect);
- *agriculture/forestry and fishing* (+2,000 jobs or 11% of total regional shift effect); and
- *public administration and safety* (+1,200 jobs or 7% of total regional shift effect).

The industry sectors with a *negative* regional shift performance were:

- *manufacturing* (-1,600 jobs or -9% of total regional shift effect);
- *construction* (-1,250 jobs or -7% of total regional shift effect);
- *financial and insurance services* (-1,250 jobs or -6% of total regional shift effect); and
- *retail trade* (-530 jobs or -3% of total regional shift effect).

Proportionately, compared with 2006 employment levels the industry sector with the highest *positive* regional shift effect were *mining* with a 62% *gain* in employment, *agriculture/forestry and fishing* with a 24% *gain* in employment, and *education and training* with a 6% *gain* in employment.

The industries with a *negative* proportionate regional shift effect all had a relatively small *loss* of employment, the highest being -4% *loss* for *financial and insurance services*.

Table 15: Regional shift effects in Brisbane, 2006-2016

	Total Shift	Regional Shift Effect	Contribution to Total Regional Shift	Regional Shift c.f. 2006 Employment Level
	(no.)	(no.)	(%)	(%)
Agriculture\ forestry & fishing	1,617	2,034	11	24
Mining	6,989	3,393	19	62
Manufacturing	-29,735	-1,595	-9	-2
Electricity\ gas\ water & waste services	2,674	26	0	0
Construction	19,464	-1,253	-7	-2
Wholesale trade	-9,208	-44	0	0
Retail trade	1,480	-527	-3	-1
Accommodation & food services	17,308	2,409	14	5
Transport\ postal & warehousing	10,782	2,413	14	5
Information media & telecommunications	-137	-367	-2	-2
Financial & insurance services	2,198	-1,150	-6	-4
Rental\ hiring & real estate services	3,272	-83	0	0
Professional\ scientific & technical services	19,875	1,159	7	2
Administrative & support services	8,607	562	3	2
Public administration & safety	12,201	1,220	7	2
Education & training	27,720	4,529	25	6
Health care & social assistance	44,148	4,101	23	4
Arts & recreation services	4,714	263	1	2
Other services	6,954	803	5	2
Inadequately described/Not stated	23,152	-85	0	0
Total Employment	174,075	17,808	100	2

Source: The authors, using data from the ABS (2017) 2016 Census of Population and Housing.

6.4 Adelaide

6.4.1 Performance 1996-2006

In Adelaide, over the period 1996 to 2006, across all industry sectors combined there was a *negative* regional shift effect of -17,180 jobs (compared with a total shift in employment of almost +68,400 jobs).

Robson's (2001) analysis showed that marginally over half of that *negative* regional shift effect is attributable to the *negative* performance by three industries:

- *health care and social assistance* (-3,366 jobs or -20% of total regional shift effect);
- *education and training* (almost -2,900 jobs or --17% of total regional shift effect), and

- *wholesale trade* (almost -2,900 jobs or -17% of total regional shift effect).

Positive regional shift effects were recorded by:

- *construction* (+2,500 jobs or +15% of total regional shift effect);
- *public administration and safety* (+2,400 jobs or +14% of total regional shift effect; and
- *mining* (almost +800 jobs or +5% of total regional shift effect).

Proportionately, compared with 1996 employment levels the *arts and recreation services* industry recorded the highest *negative* regional shift effect with a *loss* of in jobs of -18%, followed by rental, *hiring and real estate services* with a *loss* in jobs of -17% and the *wholesale trade* industry with a *loss* in jobs of -12%.

In contrast, the *mining* industry had the highest proportionate *positive* regional shift effect with a *gain* in jobs of +61%, followed by the *agriculture, forestry and fishing* industry with a *gain* of +22% in jobs, and the *construction* industry with a *gain* in jobs of +12%.

6.4.2 Performance 2006-2016

Table 16 shows the results of the analysis of the regional shift effects for the period 2006-2016 in Adelaide. Adelaide's poor *negative* endogenous employment performance over the 10 years 2006-2016 was more than -35,200 jobs which was a strong factor restricting the total growth in jobs to a meagre +52,000 over those 10 years.

That *negative* regional shift performance occurred across most of the industry sectors, with the main contributors to it being:

- *health care and social assistance* (-8,230 jobs or -23% of total regional shift effect);
- *manufacturing* (-4,800 jobs or -14% of total regional shift effect);
- *professional/scientific and technical services* (almost -4,800 jobs or -14% of total regional shift effect);
- *financial and insurance services* (almost -3,400 jobs or -10% of total regional shift effect);
- *education and training* (more than -3,000 jobs or -9% of total regional shift effect); and
- *retail trade* (almost -2,300 jobs or -6% of total regional shift effect).

Of the two industry sectors that recorded a small *positive* regional shift effect, it was only *agriculture/forestry and fishing* where there was a noticeable employment impact (+1,260 jobs or +4% of total regional shift effect), while it was *positive* but small for *public administration and safety* (+440 jobs or +2% of total regional shift effect).

Proportionately, compared with 2006 employment levels the *agriculture/forestry and fishing* industry had the highest *gain* in jobs of +21% and it was the only sector to have a noticeable *gain* due to an endogenous effect. Adelaide was more characterised by a proportionate loss of jobs in numerous industry sectors due to the endogenous effect including: a -17% *loss* for *financial and insurance services*; -15% *loss* for *professional/scientific and technical services*; -12% *loss* both for *rental/hiring and real estate services* and for *health care and social services*; -11% *loss* for *information/media and telecommunications; administrative support services* and *arts and recreation services*; -10% *loss* for *mining*; -8% *loss* for *transport/postal and warehousing*; and -7% *loss* for *education and training*.

A proportionate gain was restricted to just two industry sectors. There was a *gain* of +21% for *agriculture/forestry and fishing*, while the *gain* was +2% for *public administration and safety*.

Table 16: Regional Shift Effects in Adelaide, 2006-2016

	Total Shift	Regional Shift Effect	Contribution to Total Regional Shift	Regional Shift c.f. 2006 Employment Level
	(no.)	(no.)	(%)	(%)
Agriculture\ forestry & fishing	971	1,264	4	21
Mining	1,711	-302	-1	-10
Manufacturing	-24,201	-4,810	-14	-7
Electricity\ gas\ water & waste services	1,795	-129	0	-2
Construction	9,482	-727	-2	-2
Wholesale trade	-4,308	-454	-1	-2
Retail trade	-1,003	-2,284	-6	-4
Accommodation & food services	8,539	-120	0	0
Transport\ postal & warehousing	1,983	-1,767	-5	-8
Information media & telecommunications	-860	-1,005	-3	-11
Financial & insurance services	-1,353	-3,383	-10	-17
Rental\ hiring & real estate services	482	-974	-3	-12
Professional\ scientific & technical services	4,664	-4,776	-14	-15
Administrative & support services	3,068	-2,028	-6	-11
Public administration & safety	7,317	842	2	2
Education & training	10,599	-3,072	-9	-7
Health care & social assistance	20,860	-8,229	-23	-12
Arts & recreation services	1,887	-789	2	-11
Other services	2,192	-1,652	-5	-8
Inadequately described/Not stated	8,616	-1,998	-6	-19
Total Employment	52,441	-35,228	100	-7

Source: The authors, using data from the ABS (2017) 2016 Census of Population and Housing.

6.5 Perth

6.5.1 Performance 1996-2006

Perth recorded a *positive* regional shift of +24,728 jobs across all industry sectors combined over the period 1996 to 2006 (compared with a total shift of +139,700).

As explained by Robson (2011), this was mainly attributable to the *positive* performance of three industry sectors:

- *manufacturing* industry (more than +9,600 jobs or +39% of total regional shift effect);
- *mining* (almost +6,600 jobs or +27% of total regional shift effect);
- *public administration and safety* (more than +4350 jobs or +22% of total regional shift effect).

The highest *negative* regional shift effects were in:

- *financial and insurance services* (-1,660 jobs or -7% of total regional shift effect);
- *administrative and support services* (1,250 jobs or -5% of total regional shift effect); and
- *arts and recreation services* (-770 jobs or -3% of total regional shift effect).

Proportionately, compared with 1996 employment levels the *mining* industry recorded the highest *positive* regional shift effect with a +74% *gain* in jobs, followed by both the *manufacturing* and *public administration and safety* each with a +17% *gain* in jobs.

The highest *negative* proportionate regional shift effect was recorded in *agriculture, forestry and fishing* with a -13% loss of jobs, followed by *arts and recreation services* with a -9% loss of jobs, and *financial and insurance services* with a -8% *loss* of jobs.

6.5.2 Performance 2006-2016

Table 17 shows the results of the analysis of the regional shift effects for the period 2006-2016 for Perth. There was a *positive* performance on this endogenous employment measure of almost +48,400 jobs which accounted for one-quarter of the total growth in jobs of more than +190,600 over the 10 years, a strong performance given the onset of the bust in the resources boom in the second half of the period.

The main industry sector contributors with a *positive* regional shift effect to that strong performance were:

- *mining* (+22,460 jobs or +14% of total regional shift effect);
- *construction* (approaching +6,500 jobs or +13% of total regional shift effect);
- *transport/postal and warehousing* (almost +6,250 jobs or +13% of total regional shift effect);
- *education and training* (also almost +6,250 jobs or +13% of total regional shift effect);
- *accommodation and food services* (+5,400 jobs or +11% of total regional shift effect);
- *retail trade* (+4,700 jobs or +10% of total regional shift effect);
- *public administration and safety* (more than +3,500 jobs or +7% of total regional shift effect);
- health care and social assistance (more than +3,500 jobs or +7% of total regional shift effect); and
- the *other services* category (almost +4,800 jobs or +7% of total regional shift effect).

The industry sectors with a *negative* regional shift effect in Perth were:

- *financial and insurance services* (-2,150 jobs or -4% of total regional shift effect);
- *professional/scientific and technical services* (-2,000 jobs or -4% of total regional shift effect); and
- both *information/media and telecommunications* and *rental/hiring and real estate services* (both -1,000 jobs or -2% each of total regional shift effect).
- Proportionately, compared to 2006 employment levels there was a 29% *gain* in *mining* jobs which would have occurred in the first half of the 10-year period). Other industries with a proportionate employment *gain* were: *agriculture/forestry and fishing* with a 23% *gain*; *transport/postal and warehousing* with a 21% *gain*; *arts and recreation services*

with a 17% gain; accommodation and food services with a 13% gain; the other services category with a 12% gain; electricity/gas/water and waste services with a 12% gain; education and training with a 11% gain; construction with a 10% gain; public administration and safety with a 7% gain; and health care and social assistance with a 5% gain.

- On this proportionate measure, the information/media and telecommunications and the finance and insurance services industry sectors both had a -9% loss of jobs, while for rental/hiring and real estate services the loss was -7% and for professional/scientific and technical services the loss was -4%.

Table 17: Regional Shift Effects in Perth, 2006-2016

	Total Shift	Regional Shift Effect	Contribution to Total Regional Shift	Regional Shift c.f. 2006 Employment Level
	(no.)	(no.)	(%)	(%)
Agriculture\ forestry & fishing	1,083	1,377	3	23
Mining	22,465	6,922	14	29
Manufacturing	-20,425	1	0	0
Electricity\ gas\ water & waste services	2,990	852	2	12
Construction	25,238	6,453	13	10
Wholesale trade	-6,433	547	1	2
Retail trade	6,383	4,719	10	6
Accommodation & food services	17,328	5,392	11	13
Transport\ postal & warehousing	11,385	6,271	13	21
Information media & telecommunications	-844	-1,012	-2	-9
Financial & insurance services	348	-2,158	-4	-9
Rental\ hiring & real estate services	1,755	-1,006	-2	-7
Professional\ scientific & technical services	13,293	-2,042	-4	-4
Administrative & support services	6,208	-531	-1	-2
Public administration & safety	11,636	3,526	7	7
Education & training	24,747	6,242	13	11
Health care & social assistance	35,621	3,564	7	5
Arts & recreation services	5,646	1,705	4	17
Other services	8,507	3,380	7	12
Inadequately described/Not stated	23,695	4,183	9	22
Total Employment	190,626	48,386	100	7

Source: The authors, using data from the ABS (2017) 2016 Census of Population and Housing.

7. SUMMARISING THE ENDOGENOUS EMPLOYMENT PERFORMANCE OF THE FIVE BIG CITIES AND DRAWING IMPLICATIONS

The *endogenous regional employment performance* in aggregate employment and in industry sectors of for the five big cities over the successive 10-year periods 1996-2006 and 2006-2016 thus display significant differences both within a city over time and between the cities for a given time period. This enables us to draw some conclusions about the nature of the economies of Australia's five largest cities, the transitions that have been occurring within them since the

mid-1990s, and possible to start to speculate what might be the factors that are driving the *positive* or the *negative* performance of the cities.

Table 18 summarises the findings indicating whether that performance had been *positive* or *negative* for total employment and for the 2-digit industry classifications for the successive 10-year periods 1996-2006 and 2006-2016 for each of the five big cities. In the table the industries are grouped into broad categories that relate in part to the categorisation of work proposed by Reich (1992)⁸. The categories are for:

- resources;
- production process activities;
- logistics;
- population serving (or consumption) services;
- producer services, incorporating activities that relate to the information economy;
- government; and
- other activities.

We have demonstrated that the economic structures and the endogenous regional employment performance of Australia's five big cities differ considerably and have changed over the 20-year period 1996 to 2016 during which time the nature of Australia's economy has continued its transitioning to a more services-dominated economy. And the performance of those five big cities in terms of the *positive* or *negative* effect of factors endogenous to the cities has been subject to considerable change for some cities while it has been more stable for others.

From both the modelling undertaken by Robson (2011) for the 10-year period 1996-2006 and for this paper for the 10-year period 2006-2016 we may draw the following conclusions regarding the endogenous regional employment performance of the cities.

Sydney, the nation's largest city, which, during the era of the post-mid-1980s micro-economic reform and deregulation, emerged as Australia's world city and was booming throughout much of the 1990s, has had something of a roller-coaster ride with respect to its endogenous regional employment performance between 1996 and 2016. During the decade 1996-2016 spanning the period when Sydney hosted the 2000 Olympic games, somewhat ironically Sydney displayed *negative* endogenous employment performance over the years post-the early 1990s recession and following the 2000 Olympics, and that was the case across almost all industry sectors. The negative performance was especially marked during the five years 2001-2006. But from 2006, on that turned to a *positive* performance, and that change was widespread across industry sectors. It seems to have been driven by significant population increase which has been driven by an historically high rate of immigration (both permanent and temporary) that has generated circumstances for considerable growth in population-serving economic activities and construction and *positive* endogenous employment performance. Likewise, from 2006 on there was also *positive* endogenous employment from the producer services sectors. The housing boom and associated construction and large infrastructure projects post the GFC were drivers of the *positive* endogenous employment performance of the construction sector. The dominant strength of Sydney is evident in the producer services sectors, and especially in financial and insurance services and in information/media and telecommunications.

⁸ Reich used occupations for his classification whereas in this paper we use two-digit industry classifications. We have attempted to reflect some of the Reich classifications.

Table 18: Endogenous Employment Performance by Industry Sectors for the Five Big Cities, 1996-2006 and 2006-2016

(P=Positive; N= Negative)

Industries	Sydney 1996-06	Sydney 2006-16	Melbourne 1996-16	Melbourne 2006-16	Brisbane 1996-06	Brisbane 2006-16	Adelaide 1996-06	Adelaide 2006-16	Perth 1996-06	Perth 2006-16
RESOURCES										
Agriculture/forestry & fishing	N*	P*	N*	P*	N	P*	P*	P*	N*	P*
Mining	N*	N	N*	N*	P*	N	P*	N*	P*	P*
PRODUCTION / PROCESS ACTIVITIES										
Manufacturing	N*	N	N	P	P*	N	N	N	P*	P
Electricity/gas/water & waste services	N*	N*	N*	P*	P*	P	P	P	P	P*
Construction	N*	P*	P	P	P*	N	P*	N	P*	P*
LOGISTICS										
Transport/postal & warehousing	N	N	P	P*	P*	P	N	N	P	P*
Wholesale trade	P	N	P*	P	P	N	N*	P	N	P
POPULATION SERVING/ CONSUMPTION SERVICES										
Retail trade	N	P	P	P	P	N	P	N	P	P
Accommodation & food services	N	P	P	P*	P	P	N	N	P	P*
Education & training	N	P	P	P	P	P	N	N	P	P*
Health care & social assistance	N	N	P	P	P*	P	N	N*	P	P
Arts & recreation services	N	P	P*	P*	P	P	N*	N*	P	P*
PRODUCER SERVICES										
Information/media & telecommunications	P	P*	P	P	N	N	N	N*	N	N
Financial & insurance services	P	P	P	P	P	N	N	N*	N	N
Rental/hiring & real estate services	N	P	P*	P*	P*	N	N*	N*	N	N
Professional/scientific & technical services	N	P	P	P	P	P	N	N*	P	N
Administrative & support services	N*	N	P	N	P*	N	N	N*	N	N

Table 18: Endogenous Employment Performance by Industry Sectors for the Five Big Cities, 1996-2006 and 2006-2016 (Continued)

(P=Positive; N= Negative)

Industries	Sydney 1996-06	Sydney 2006-16	Melbourne 1996-16	Melbourne 2006-16	Brisbane 1996-06	Brisbane 2006-16	Adelaide 1996-06	Adelaide 2006-16	Perth 1996-06	Perth 2006-16
GOVERNMENT										
Public administration & safety	N*	P	N	P	P	P	P	P	P*	P
OTHER ACTIVITIES										
Other services	N	N	N	P	P	P	N	N	P	P*
Inadequately described/not stated	P	P*	P	P*	P*	N	N*	N*	N	P*
TOTAL EMPLOYMENT ACROSS ALL SECTORS	1996-06 N*	2006-16 P	1996-06 P	2006-16 P*	1996-06 P*	2006-16 P	1996-06 N*	2006-16 N*	1996-06 P	2006-16 P
	1996-01 N	2006-01 N	1996-01 P	2006-01 P	1996-01 P	2006-01 P	1996-01 N*	2006-01 N*	1996-01 P	2006-01 P*
	2001-06 N*	2001-16 P*	2001-06 P	2011-16 P*	2001-06 P*	2011-16 P	2001-06 N*	2001-16 N	2001-06 P	2011-16 P

Note: * denotes a strong positive performance [shaded green]; or a marked negative performance [shaded red].

Source: The authors.

Thus, in Sydney since the mid-2000s seems to be regaining endogenous characteristics/factors/processes that are enhancing its employment performance and this has been happening across most of the industry sectors after a period from 1996 to 2006 when these things endogenous to the city had been having a detrimental effect on its employment performance.

Melbourne, in stark contrast to Sydney, has displayed continuous positive endogenous regional employment performance since 1996, and that has been widespread across many of the industry sectors, and the performance has tended to strengthen since 2006. The positive endogenous employment performance by the population serving services industries in Melbourne is being strongly driven by the rapid population growth occurring in Melbourne both through net internal migration gains and through high levels of immigration with the city looking poised to soon overpass Sydney to become the nation's largest big city. We are also seeing strong *positive* endogenous performance by some of the producer services, and there is substantial growth in the government sector. Reinforcing its national leading role, Melbourne is also displaying positive endogenous employment performance in logistics-related industry sectors. And since 2006 there has been *positive* endogenous performance in manufacturing.

Thus, since the mid-1990s Melbourne has exhibited endogenous characteristics/factors/processes that have enhanced its employment performance and that has been the case across most of the industry sectors.

Brisbane has had *positive* endogenous regional employment performance throughout the 20-year period 1996-2016 as a predominantly consumption economy with consistently strong *positive* endogenous performance across the population-serving industries. That reflects the role of net in-migration to Brisbane (which has waned somewhat over the last decade or so) and also of immigration in population growth as a driver of the Brisbane economy. But it is significant that the performance of retail trade endogenous employment had turned negative since 2006. It seems that for Brisbane the government sector is also important in underpinning some of the positive performance in population-led services sector employment. There had been *positive* endogenous employment performance across the producer services industries between 1996 and 2006, but that has turned to a *negative* performance since 2006 by quite a few of them. The endogenous employment performance of manufacturing in Brisbane had also turned from being positive to *negative* as it has for mining and for construction.

Thus, since the mid-1990s Brisbane has had endogenous characteristics/factors/processes that have in general had an enhancing effect on its employment performance, but that has not always been positive for a small number of industry sectors.

Adelaide is clearly the stand-out poor performer for on the endogenous regional employment measure consistently showing a *negative* performance throughout the 20 years from 1996 to 2016, and that negative performance has been very widespread across most industry sectors, with the resources industries being the exception although the performance for *mining* turned *negative* after 2006. Manufacturing, which historically had been a strength of Adelaide's economy under the post-World War II protectionist regimes, has fared particularly poorly in recent times with negative performance throughout the period from 1996 to 2016. Adelaide's continuing low population growth rate is a factor in the consistently *negative* endogenous employment performance across all of its population-serving industry sectors. And the city's producer services industries sectors also display negative endogenous employment performance across the 20 years from 1996 to 2016. It has really only been the public administration and safety services sector where a *positive* endogenous employment performance has been evident. This continuing lagging performance of Adelaide – once Australia's third largest city but now ranking fifth – is a national issue.

Thus, Adelaide seems to be continuing long-term to have endogenous characteristics/factors/processes that are detrimental for its employment performance and that is widespread across industry sectors.

Perth continues to display *positive* overall endogenous regional employment performance since 1996 despite the onset of the end of the resources boom from earlier in the current decade, although the strength of that performance has waned somewhat after 2001. However, since 2006 there has been a *negative* endogenous employment performance across many of the producer services industries and for some that has been negative throughout all the 20-year period from 1996 to 2016. But, indicative of the end of the resources boom is the change from a *positive* endogenous employment performance between 1996 and 2006 to a *negative* performance after 2006 by the professional/scientific and technical services sector. It is significant that there has been continuing *positive* endogenous employment performance by Perth in construction and in mining and manufacturing as well (but less so since 2011). Strong *positive* endogenous performance is also evident in areas related to government spending, including public administration and safety, education and training, and health care and social assistance.

Thus, since the mid-1990s Perth in general has exhibited endogenous characteristics/factors/processes that have had an enhancing effect on its employment performance which has been evident across most but not all industry sectors, but that enhancing effect has been a bit less so following the ending of the mining boom.

From the analyses reported in this paper the following general conclusions may be drawn:

- for Australia's five big cities there are in general *endogenous* factors - and *exogenous* factors as well - that are detrimental for enhancing employment in manufacturing as the transition to a services-dominated economy continues;
- especially for Sydney and Melbourne, there are endogenous characteristics/factors/processes that are enhancing employment performance in producer services industries;
- in general for the five big cities, public sector spending on infrastructure and services is likely to be a driver of the endogenous enhancement that has been occurring for employment in construction and in some of the service industries; and
- except for Adelaide, population growth (and especially high levels of immigration to Sydney and Melbourne) is driving the endogenous employment performance of population-serving industries.

It will be interesting to see what changes in the endogenous regional employment performance of the five big cities over the next 10-year period from 2016 to 2026. Will Sydney continue its re-emergence as a city with positive performance? Can Melbourne continue to maintain its strong positive performance? Will Brisbane be able to diversify from being essentially a consumption economy to broaden its positive performance to across other sectors? Will there be a strong resources sector recovery to spur continuation of Perth's generally positive performance? And what will happen to the lagging Adelaide – can it somehow generate new endogenous factors and processes that will drive economic growth and generate positive endogenous performance?

What has not been done in this paper is to disaggregate the metropolitan economies of the five big cities into their constituent functional economic (labour market) regions (FERs) which has been done in the research by Stimson, et al. (2018) for their modelling of aggregate employment endogenous performance in FERs across all of Australia. That would shed additional insights

into the variation that might exist in the endogenous employment performance in labour market areas within a city for the various industry sectors in a spatially disaggregated way.

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Is There Really a Housing Affordability Crisis in Australia, and If So, What is Causing It?

Robert J. Stimson

University of Melbourne and University of Queensland, Australia

rstimson@unimelb.edu.au

ABSTRACT

There is much debate in Australia on the issue of housing affordability - some call it a 'crisis' - as housing prices have increased substantially in some cities and regions, and the entry of first home buyers into the market is supposedly being restricted. Housing affordability is a vexed issue, with its definition lacking precision. Housing markets for home purchase and renting are far from homogeneous, with variations in house purchase prices and level of rents displaying considerable spatial differentiation, which has always been the case. Key issues are: what are the factors – demand drivers, supply constraints, and institutional factors – impacting housing affordability; whether housing unaffordability is city and location-specific and whether it is specific to household types and circumstances; and the degree to which within a city the lack of affordability reflects the location specific preferences/aspirations of specific individuals or households. The paper canvasses those issues, along with what might be done to address housing affordable.

PRELUDE

I have been involved in researching housing issues off-and-on since the early 1970s. My doctoral thesis investigated the residential location decision process and choice of residents in metropolitan Adelaide in the context of urban social structure (Stimson, 1978). With numerous collaborators I have been involved in investigating a range of housing-related topics, including:

- residential location decisions and choice process (Stimson, 1973; Stimson, 1980; Stimson, 1987; Golledge and Stimson, 1987, 1998; Stimson and McCrea, 2004);
- the provision of public housing (Paris, Stimson and Williams, 1984; Maher, Wulff, Yates, Beer, Stimson, Earl and Wood, 1970; Stimson, 1993);
- housing assistance for first home buyers (Beed, Stimson, Paris and Hugo, 1989);
- homelessness (Lanyon, Manicaros, Macckdacey, Stimson, and Western, 1999; Western, Stimson, Johnston and Baum, 2002);
- housing tenure, renting and affordability (Stimson, 1988; Paris and Stimson, 1986; Stimson, 1988; Maher and Stimson, 1996);
- relationships between housing and jobs markets (Stimson, 1997); and

- the housing choices of older households and the provision of retirement housing options (Stimson, Manicaros, Kabamba and Murray, 1997; Maher and Stimson, 1996; Manicaros and Stimson, 1999; Stimson, 2002; Jones, Howe, Tilse, Bartlett, and Stimson, 2010).

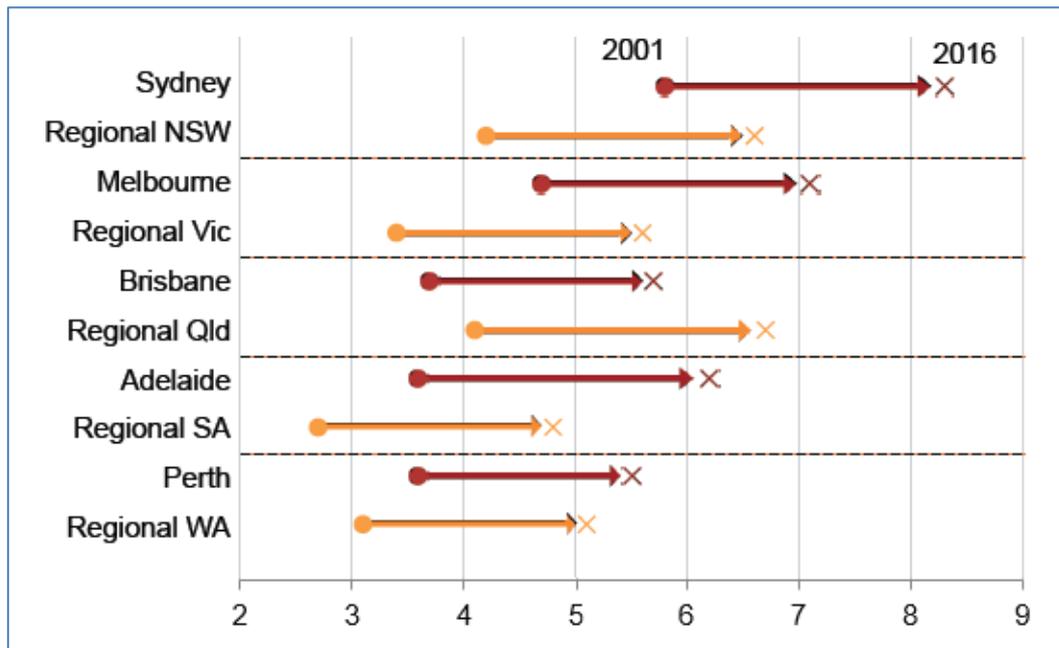
It is thus with great interest that I have followed recent research, commentary and debate on housing affordability in Australia.

1. INTRODUCTION

Debate on housing prices continues to rage, with many claims Australia has a housing affordability ‘crisis’, imposing housing stress on many households, and leading to first home buyers being locked out of entry to home ownership and relegated to a future of long-term renting. The discussion is often emotional and ideographic, citing the plight of individual people or households and highlighting the price of housing in specific areas. Indeed, quite a bit of the discussion is focused on housing prices and the plight of younger people in inner-city areas.

Up until 1996, housing price increases in Australia tended to track earnings increases, but since then there has been an increasing discrepancy, which accelerated significantly from around 2012. While this discrepancy has been most marked in the capital cities – but with big differences between them – it has also occurred in some of the regional areas beyond the capital cities (see Figure 1). The discussion on housing affordability largely is about the high cost of housing in Sydney and in Melbourne, with median prices in Sydney increasing by 88% to more than \$1 million over the last decade, while Australia-wide weekly wages increased by 36%. A Reserve Bank of Australia (RBA) report (La Cava, Leal and Zurawski, 2017) suggested a medium-income first-time home buyer in Sydney could afford just over 10% of homes sold in 2016, and to find an affordable house, many first-time buyers have had to move about 50 kilometres from the CBD.

Figure 1: Ratio of Median Dwelling Prices to Median Gross Household Income: Change 2001 to 2016



Source: Grattan Institute (2018).

The debate is fueled by often rather sensational and selective commentary in the media, and it has captured the attention of politicians of all political orientations. Governments have a history of being prone to pursue often knee-jerk and largely ineffective interventions, such as providing grants to first home buyers, and tending to repeat past mistakes.

The so-called ‘crisis’ is not just about the escalation in housing prices. It is also about other issues, including a decline in home ownership, housing insecurity for renters, a shortage of social housing, long commutes, over-crowding, and an increase in homelessness. It is about low-income households having to use a substantial proportion of their income to pay meet their housing costs, being far more prone to be living in a dwelling which is neither adequate or secure and being more likely to be living at a location with poor accessibility to employment and services. That can have implications for the city’s economy and social inclusion, as revealed in a Sydney study by Gurran, Gilbert, Zhang and Phibbs (2018) which found many workers providing key services in health and emergency in the CBD and inner-city areas are increasingly being forced to live in the outer suburbs and having to experience long commutes. As Yates (2007, p. 1) pointed out:

... If housing absorbs a high proportion of household budgets ... then the trade-offs households are required to make in order to meet their housing needs may mean they have inadequate resources to meet their non-housing needs.

It is, however, no new thing for there to be a debate on housing affordability in Australia as evidenced by the many studies on the issue over the years by researchers (see: Abelson, 1993; Paris, 1993; Yates and Gabriel, 2006; Yates and Milligan, 2007; Beer, Kearns and Pieters, 2007; Mulligan, Phipps, Gurran, and Fagan, 2007; Yates, 2008; Taylor, 2009; Milligan, Martin, Phillips, Liu, Pawson, and Spinney, 2016), Worthington, 2012; Rowley and Ong, 2012); Industry Super Australia, 2017; Core Logic, 2017; Daley and Coates, 2018; Gurran, Rowley, Milligan, Randolph, Phibbs, Gilbert, James, Troy, and van den Nouwelant, 2018; Mares, 2018; Muir, Martin, Lui, Kaleveld, Flatau, Etuk, and Pawson, 2018). Such studies investigating housing affordability have typically canvasses a wide range of issues.

There have also been many official inquiries into housing affordability by the government bodies, including:

- Committee of Inquiry into Housing Costs, 1978;
- the 1989 Special Premiers Conference on Housing (including the Graham Report);
- the 1990-1992 Housing Costs Study;
- the 1991 National Housing Strategy;
- the Senate Select Committee on Housing Affordability, 2001;
- the First Home Ownership Inquiry Report (Productivity Commission, 2004);
- the Commonwealth of Australia, 2008, Housing Affordability Fund;
- A Good House is Hard to Find: Housing affordability in Australia (Senate Select Committee, 2008);
- the Australia’s Future Tax System Review, 2010;
- the National Housing Supply Council, 2012; and
- the Senate Economics Reference Committee, 2015.

It is important to recognise that housing affordability is impacted by many variables that:

- on the one hand are *exogenous* to a specific city or region, such as level of interest rates; while
- on the other hand, are *endogenous* to a city or region, such as local authority land use zoning and State and Territory government planning processes, that might restrict supply.

Research on housing affordability has tended to focus on both *demand* drivers *supply* issues:

- *demand drivers* include: rapid population growth and household formation - driven largely through immigration - and economic growth pressures on housing demand; the impacts of cheap finance, taxation and government other regulation; and access to affordable housing for low income households and for first home buyers:
- *supply issues* include: government planning policies constraining land supply; planning and zoning systems and processes interventions; and government initiatives facilitating the provision of below market rent housing.

Some impacts are *institutional* factors relating to government policy, regulations and interventions at all three levels of government and might be regarded as ‘unintended consequences’.

To ascertain if there is a pervasive housing affordability ‘crisis’ in Australia, we need to address questions including the following:

- What is the level of housing costs/prices in Australia, and how do they vary spatially?
- How should housing affordability be defined and measured?
- What are the factors impacting housing affordability?
- Does it apply to home purchasers or renters or to both?
- What specific households are impacted?
- Is the incidence of the crisis homogeneous across urban space, or is it restricted to specific locations?
- To what extent is the housing affordability question a trade-off choice between individual/household preferences?
- What, if any, might be appropriate interventions by governments to ameliorate the incidence of unaffordable housing?

This paper canvasses such questions in discussing housing prices and the vexed issue of housing affordability – how to measure it; who it is impacting; how widespread unaffordability might be; what is impacting it; and what might be done about it. The paper poses the general question: *Does Australia really have a housing affordability crisis?*

But before proceeding, it is important to draw a distinction between:

- *housing affordability*; and
- *affordable housing*.

The latter is vital for disadvantaged lower-income households eligible for access to public or other non-market (social) housing and for access to rental assistance for private renters. The former refers to the affordability of housing generated through the market.

2. THE COMPLEXITY OF HOUSING MARKETS, HOUSING PRICES AND HOUSING COSTS, AND OF HOUSING AFFORDABILITY

Australia’s housing stock is almost 10 million housing units, with a value estimated to be \$6.7 trillion. It has increased by about 1.6 million units or 17.5% over a decade. At the 2016 census, owner occupied housing was 5.4 million or 66%, and rental housing – of which 415,000 were social housing units – was 2.6 million, the balance being unoccupied or of unknown tenure.

Some 31% of the housing stock is held by investors who provide rental housing, with 62% being negatively geared.

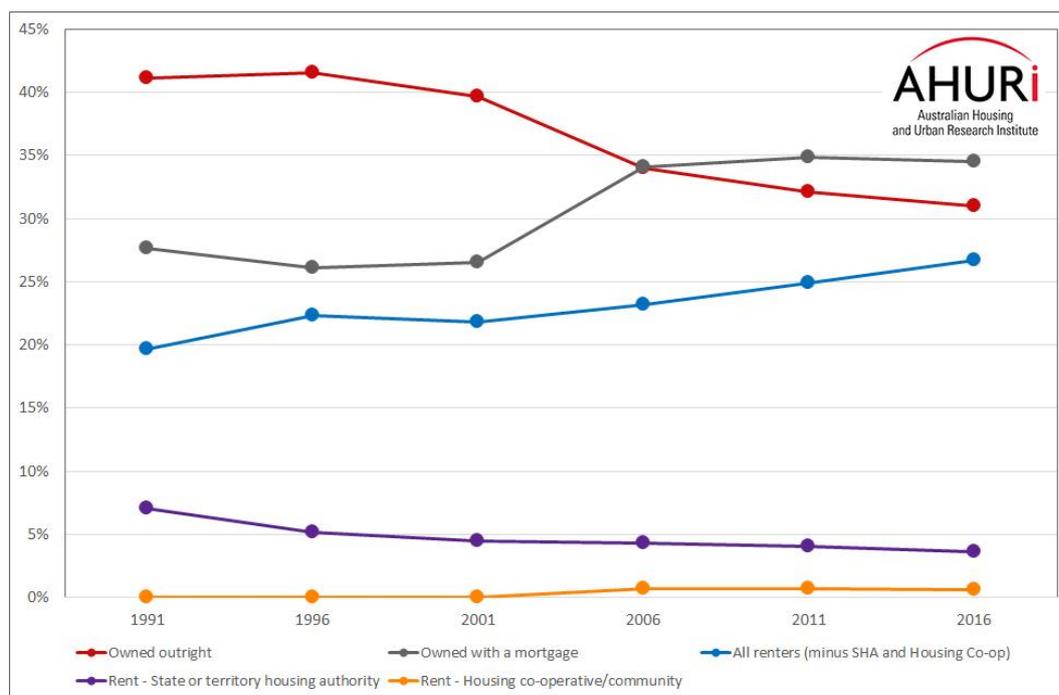
The ratio of housing debt to income has quadrupled since the mid-1980s, hitting an all-time high of 194% in 2017, with an increase of almost 25% over just four years. Concerns are being expressed about the servicing of that level of debt if interest rates and inflation were increase.

When we talk about housing markets, housing prices and costs, and housing affordability we are talking about a complex set of issues.

2.1 A Note on Housing Tenure

Any discussion of housing affordability needs to occur within the context of the dynamics of housing tenure over time. Figure 2 shows the distribution of housing tenure types in Australia.

Figure 2: Trends in Housing Tenure Types over the 25 years from 1991 to 2016



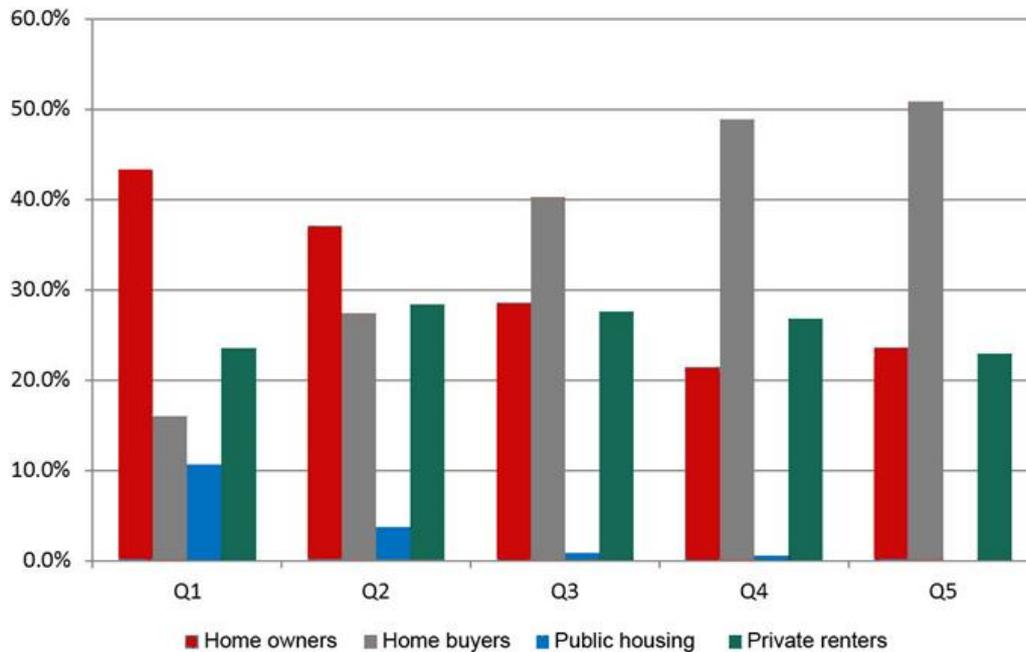
Source: AHURI (2017).

Over the quarter-of-a-century from 1991 to 2016 the incidence of home ownership declined, while the incidence of renting increased. This has been latched onto as being indicative of a decline in housing affordability, with claims aspiring home owners are being priced out of entering the first home buyer market with an increasing number being relegated to a long period of being renters, even permanently.

Between 1991 and 2016, home ownership in Australia nationally declined from 68.6% to 65.5%, with the incidence of outright ownership down 10% from 41.1% to 31.0%, while the incidence of those purchasing with a mortgage was well up from 27.5% to 35.5%, an increase of 7%. Renting was up from 26.9% in 1991 to 30.9% in 2016. But the incidence of renters in social housing was significantly down from 7.1% in 1991 to just 4.2% in 2016. Among the capital cities, the incidence of renting was highest by far in Darwin at 44.4%, while it was 34.5% in Brisbane, 34% in Sydney, and 31.8% in the ACT. Renting was lower in the other capitals at 28.9% in Adelaide, 26.7% in Perth, and 20.5% in Hobart.

Figure 3 shows housing tenure varies markedly across income groups. The incidence of outright home ownership declines as income decreases, while buying increases as income declines. The incidence of private renting is most marked for the Q2 and Q3 households, with it varying from a low of 22.9% of Q5 households to a high of 28.4 per cent of Q2 households.

Figure 3: Housing Tenure for Income Quintile Groups in Australia, 2013-14



Source: AHURI Briefs (2016), using ABS data.

The Australian Housing and Urban Research Institute (AHURI) (2016) makes this telling point:

... It is likely many of the Q1 households comprised retired householders living in the homes they bought when they were working and are now on government support such as age pensions. Indeed, 44 per cent of households aged 65 and over were Q1 and 63.7 per cent of 65+ households' main source of income came from Government pensions and allowances. This highlights the importance of Q1 households buying into home ownership during their working careers.

In addition, the incidence of home ownership varies greatly across age groups, and that has changed over time (see Table 1). In 2016 the rate of home ownership increases markedly from 47% for the households with a reference person aged 25-34 years to a high of 79% for the 55-64 and 65 and over age cohorts. But for all age cohorts, home ownership rates are below what they were back in 1991 and in 1961.

It is thus important to recognize the decline in home ownership in Australia is not altogether a recent phenomenon as research by Yates (1999; 2002; 2007) has indicated, with falls occurring between 1975 and 1994 that were associated with low income and with being a couple with children. Falling home ownership rates were most marked in the larger capital cities, particularly between 1986 and 1996, which was associated with large increases in median house prices in those cities.

But the more recent decline in home ownership since during the current decade has been especially marked for the younger ages (under age 35 years), and also among high income households and for older couples without children.

Table 1: Rates of Home Ownership for Household Age Cohorts Defined by the Age of the Reference Person at the 1961, 1991 and 2011 Censuses

Age of household reference person	(% rounded)		
	1961	1991	2011
15-24 years	31	24	25
25-34 years	60	56	47
35-44 years	72	74	64
45-54 years	75	81	73
55-64 years	78	84	79
65 years and over	81	84	79
All	72	72	68

Source: ABS censuses.

However, it may be that some part of the decline in home ownership among the younger adult age cohorts might be due to what McDonald (2003, p. 7) had discussed as being part of the "... deferring of life cycle events" as younger people defer marriage and having children to an older age than in the post-war years for the baby-boomer generation".

McDonald argued this phenomenon of delay of major life course transitions has been broadly related to changes in the nature of the labour market, which has been encouraging young people to invest more heavily in their own human capital (education and work experience) before "getting on with the rest of their lives." (p. 13). Thus social – including life-style – as well as economic issues, are involved in the decline occurring in home ownership, and that continues to be so today.

2.2 A Multitude of Housing Markets

It is essential to recognize there is not a homogeneous, single housing market across Australia. Rather, there are multiple housing markets, differentiated on many dimensions including:

- tenure types - owner-occupied, private rental, public rental;
- people and households at different stages of the life-family cycle - singles, young couples, aspiring first home buyers, families, empty-nesters, retirees.
- existing dwellings and new dwellings;
- dwelling types - stand-alone houses, flats and apartments of medium and high density;
- city or metropolitan and non-metropolitan or regional areas;
- differences between the metropolitan cities; and
- difference within cities - inner-city, middle suburbs, outer suburban, urban fringe.

Over time those multiple markets - differentiated both by *people* and by *place* - can move at different paces and sometimes in different directions. That certainly complicates the debate on housing affordability, for what might be unaffordable at a point in time for one group of people/households differentiated by stage in the life-family cycle socio-economic status, might not be affordable for another group, and what might constitute affordability will certainly be differentiated by geographic location.

Thus, a 'one-size-fits-all' notion of rising housing prices and of housing affordability simply does not make sense. Similarly, a 'one-size-fits-all' policy and intervention approach to address housing affordability will be inappropriate.

2.3 Recent Trends in Housing Prices

What has been happening with housing prices in Australia in recent times?

As already stated, housing affordability in Australia is not a new issue attracting research, debate and media attention. For example, Worthington (2012) found that over the quarter-of-a-century since from the mid-1980s to the end of the 2000s, housing affordability had worsened significantly for Australia to become one of the world's most unaffordable. A recent report by CoreLogic (2017, p. 6) claims:

... the cost of buying a dwelling currently takes 7.2 times the annual income of a typical household – up from 4.2 times income 15 years ago....

.... It now takes 1.5 years of household income to save for a 20% deposit on a dwelling compared with 0.8 years 15 years ago and servicing a typical loan of 80% of the value of a dwelling now requires 38.8% of household income, compared with 25.2% in 2001.

There is no doubt that there has been a rapid and dramatic increase in housing prices in Australia, as evidenced in movement in capital city median house prices (see Table 2). But it is important to emphasize the huge differences that exist between the metropolitan capital cities. In Sydney housing prices had increased by more than 70% over the five years to 2017, while the increase was 57% in Melbourne.

Table 2: Capital City Median House Prices Over Time (\$)

City	March 1980 \$	March 2016 \$	March 2018 \$
Sydney	64,800	999,600	1,150,357
Melbourne	40,800	713,000	855,000
Brisbane	34,500	480,000	515,000
Adelaide	36,300	445,000	470,000
Perth	41,500	520,000	515,000
Canberra	39,700	570,000	614,000
Hobart	Not available	385,000	492,000
Darwin	Not available	582,500	520,000

Source: Real Estate Institute of Australia (REIA).

Data from the Real Estate Institute of Australia (REIA) shows housing prices had peaked in mid-2017, with an easing since, especially in Sydney – which has been an over-heated market with the highest housing prices in the nation – but in Melbourne as well. That is evident from the data in Table 3, with Redman (2018a) suggesting Australia's housing boom is “well and truly over” as the market “comes off the boil” (p. 5), which is reflected in substantial declines in auction sales rates and with new listings of properties in August 2018 running ahead of sales by some 18%, which is a significant reversal of the situation at the peak of the boom when the number of sales were exceeding the number of new listings by some 30% (Uren, 2018b).

Much of the decline in house prices is – and will likely continue to be – geographically concentrated and be far greater in the top quartile of the market, with a decline of almost 9% evident in Sydney (Redman, 2018a). The decline continues in Perth and regional Western Australia where it has been associated with the ending of the mining boom earlier this decade. But for some capital cities - and indeed outside of them in regional areas – there is evidence of continued growth in house prices, which is indicative of the counter-cyclical patterns that tend to occur geographically in housing prices in Australia.

Table 3: The ‘Property Divide’ Across the Nation: The Most Recent Annual Change in House Prices

Market	% Decrease	% Increase
Sydney	-5.4	
Rest of New South Wales		+1.29
Melbourne	-0.5	
Rest of Victoria		+4.9
Brisbane		+1.2
Rest of Queensland		+0.2
Perth	-2.3	
Rest of Western Australia	-4.8	
Adelaide		+0.7
Rest of South Australia		0
Hobart		+11.5
Test of Tasmania		+5.9
Canberra	-6.2	
Darwin		+2.4

Source: As reported in Redman (2018a).

There are concerns the decline in house prices will become more systemic in the now inevitable downside phase of the residential property cycle. It will be exacerbated with the tightening of credit that has been occurring, the withdrawal of foreign buyers, and the uncertainty relating to the changes in negative gearing arrangements that are foreshadowed with a change nationally to a Labor government in 2019.

There is much talk of an over-supply in the apartment market in the big cities - especially in inner Melbourne, but also in Brisbane - with an easing of prices, which has been very significant in CBD and some other inner-city locations, with a likely decline in real values of apartment properties leading to negative equity. Data from Westpac Bank shows that financing of purchases of newly built ‘off-the-plan’ apartments is down 11%, and financing of new apartment construction is down 6.6% (as reported in Uren, 2018a: p. 4). Some other segments of the market are also down, with owner occupied housing construction loans down 8% over the year (Uren, 2018a). And ABS data show there is now a substantial decline occurring in approvals for apartment construction.

But there always has been much volatility/variability in housing markets in different parts of the country. For example, Ironside (2018a) quotes Real Estate Institute of Queensland’s *Market Monitor* showing that in Queensland apartment prices fell 1.5% from \$400,000 to \$394,000 in the December quarter 2017, with apartment sales over the 2017 calendar year easing by 16.5% and apartment listings increasing by 15.2%. That easing varied across space, with the performance remaining positive in the Gold Coast, the Sunshine Coast and Redlands, while in Brisbane City apartment sales prices declined by 2.2% to \$440,995 in the December 2017 quarter. Across Queensland, 210,374 apartments and 59,000 houses were up for rental, an increase of more than 5% for the calendar year 2017, but vacancy rate remained low at 3%. At the same time, house prices in Queensland increased by 2.8%.

And as reported by Redman (2018b), within the capital cities the decrease in housing prices occurring since mid-2017 has been extreme in some locations, being more than 20% in Burswood and Cawley in Perth, Bethania in Brisbane, Armadale in Melbourne, and Hunters Hill in Sydney. In all, some 30 localities across Australia’s capital cities have experienced a decline of more than 13%. Those localities are spread across all the cities except Hobart, and across both the inner city and outer suburbs.

However, despite an easing – and even a drop – in housing prices across much of Australia over the last year or so, nonetheless they remain almost one-third higher than five years previously. A Grattan Institute report (Daly and Coates, 2018) suggests a decline in house prices will *not* solve the main issue of affordability, with house prices continuing to be at a high level - much higher than they should be. Indeed, Sydney’s house prices are still 9.1 times greater than incomes, and in Melbourne they are 8.1 times greater.

It is important to recognize that if there is a housing affordability ‘crisis’ then it is *not* being caused by interest rates which for home loans are at record low levels - ranging from an average of 4.33% for a 2-year fixed to 5.05% for a fixed rate - and have been since the Global Financial Crisis (GFC) when the RBA quickly intervened to dramatically reduce interest rates, with the cash rate still being maintained at a very low level of 1.5%. Back in the late 1980s and into the 1990s, home mortgage interest rates for owner occupiers sky-rocketed to be pegged at around 15%, with interest on loans on investment property exceeding 20%.

So, it must be other cost factors, such as the costs of land for residential development and building house costs, along with demand drivers relating to population growth and household formation – driven by historic high levels of immigration – that have been the causes of high housing prices in recent times.

2.4. Placing the Recent House Price Boom in Historic Perspective

What we are seeing in Australia is the playing out of yet another cycle in residential property prices. Housing prices have always been characterised by cycles, with prices in the up-side boom phase subject to rapid increase in real values, followed by an inevitable ‘bust’ or down-side phase with prices stagnation - or even decline in real terms - with house prices lagging-behind increases in the cost of living. And, as already noted, it has always been the case across Australia’s cities and towns, as well as across the suburbs within individual metropolitan city regions, for there to be marked geographic variations in local housing markets and housing prices. It has never been – and likely never will be – the case of one-size-fits-all, as clearly demonstrated in the current vast differences in median house (and apartment) prices suburb-by-suburb and town-by-town across Australia.

It is thus important to place the discussion of the recent housing boom into proper perspective, as the reality is that there always have been ‘boom and bust cycles’ in property prices, including residential. This is clearly demonstrated in a recent analysis by the chief economist at BIS Oxford Economics (Gelber, 2018) who maps out four residential property booms in Australia over the last five decades, all having somewhat different characteristics:

1. In the second half of the 1970 housing prices more than doubled peaking in 1980 with the subsequent downturn followed by eight years of stagnation. High inflation was running rampant overstating the upswing in house prices which was to trigger the downturn.
2. In the boom from 1987 to 1989 prices again doubled, followed by eight years of downturn. Again, that boom was during a period of high inflation and very high interest rates, with the same effects as in the previous boom.
3. From about 1997 prices were again on the rise doubling by the peak in 2003-04, again followed by a downturn with 10 years of stagnation, leading to a substantial deficiency in housing stock, with prices too low to underpin new housing development. Price rises were needed to initiate an upswing, but the GFC occurred with developers and buyers cautious. That time there was much more moderate inflation and interest rates.
4. The most recent boom starting in 2013 was kickstarted by Chinese investment and driven by higher levels of immigration with price rises gradually spreading culminating large

price increases – especially in Sydney and Melbourne – to peak in mid-2017. Gelber thinks there will be another period of stagnation before the next upswing. But this latest cycle has been characterized by substantially lower inflation with record low interest rates encouraging households to take on higher debt and in turn finance the rise in prices. That has led to concerns about the vulnerability of recent mortgages to rising interest rates.

Gelber notes that in all these cycles the initial upswing in prices was underpinned by a substantial deficiency in the housing stock and that industry response can lead to a subsequent oversupply, evident now in the apartment market in some of the capital cities. The trigger in the upswing and the downturn hinges on interest rates and the availability of finance. And the downswing involves a substantial fall in dwelling construction which can drop to levels to below underlying demand to absorb the excess stock created during the boom.

In all the past cycles, Sydney house prices rose particularly steeply and were to then fall in real terms, and that seems to be happening again in the current downswing, especially in parts of the market.

3. DEFINING AND MEASURING HOUSING AFFORDABILITY

There are widespread claims in recent years that housing prices in Australia are unaffordable, and community concern about that is certainly reflected in the results of survey research conducted for CoreLogic (2017).

The *Demographia International Housing Affordability Survey* (2018) ranks Australia’s capital cities as having ‘severely unaffordable’ housing, ranking Sydney as the second most unaffordable market in the world ahead of New York and London and behind only Hong Kong.

The Urban Development Institute of Australia (UDIA, 2018) provides several measures of housing affordability – as shown in Figure 4 – to claim (*idem*, p. 7):

... the ongoing deterioration of housing affordability across the nation is both a wicked public policy issue for government while also presenting a major challenge for the development industry. Across various measures it is far more expensive, and with much higher barriers to entry, to ‘afford’ to access the housing market than it was even a decade ago.

Table 4: Housing Affordability Measures (at September 2016)

Metropolitan city	Price to income ratio	% of household income required for a 20% deposit	% of household income required to service a 80% LVR mortgage	% of household income required to rent a home
Sydney	8.3	168%	44%	29%
Melbourne	7.1	143%	38%	27%
Brisbane	5.7	114%	30%	25%
Adelaide	6.2	124%	33%	26%
Perth	5.5	111%	29%	22%
Canberra	5.2	104%	27%	21%

Source: UDIA (2018).

Data in the table highlight the considerable variations that exist between the main metropolitan markets. It is aspiring first home buyers who are really being impacted, and across all jurisdictions except Western Australia there had been a “wholesale reduction in First Home Buyers in the market” (UDIA, 2018, p. 7). The decline in their presence in home loans across the period 1991 to 2017 was most pronounced in New South Wales where the decline was from

17% to 11%, while the decline in Victoria was from 21% to 17%, and in South Australia from 16% to 12%. On the measures in the table, it is evident the affordability problem is geographically concentrated, being most marked in severity in Sydney and Melbourne. And it is also evident the percentage of household income required to service a mortgage was considerably greater than to rent, and that was also especially so in Sydney and Melbourne.

But it needs to be pointed out that the debate on housing affordability does not sufficiently distinguish between:

- on the one hand, *housing prices* and their supposed *affordability*, an issue that defies precise definition; and
- on the other hand, *housing household financial stress*.

And that requires a clear definition of terms and rigorous measurement.

The way housing affordability and housing-related financial stress is defined and measured is certainly variable, somewhat loose, and open to questioning, particularly given the way the topic is discussed by the media and among politicians. Some of those variations are discussed in the sections that follow.

3.1. Non-official Common Measurement Approaches

Especially in the reporting on housing affordability by private sector interests, it is common-place for housing affordability to be discussed in terms of:

- housing being *unaffordable* if a household is having to expend *more than 30% of its gross income on housing mortgage payments or on rent*: and
- the *cost of purchasing a home* being *more than a specific multiple of household gross annual income*, which is often taken to be when the median house price is a multiple of more than 3 or 4 times the national medial level of household gross annual income.

3.1.1. The Percentage of Household Income to Meet a Mortgage Repayment

This is a somewhat spurious measure of housing affordability as it is quite common-place for many households to voluntarily commit to spend more than 30% of household gross annual income on repaying a mortgage.

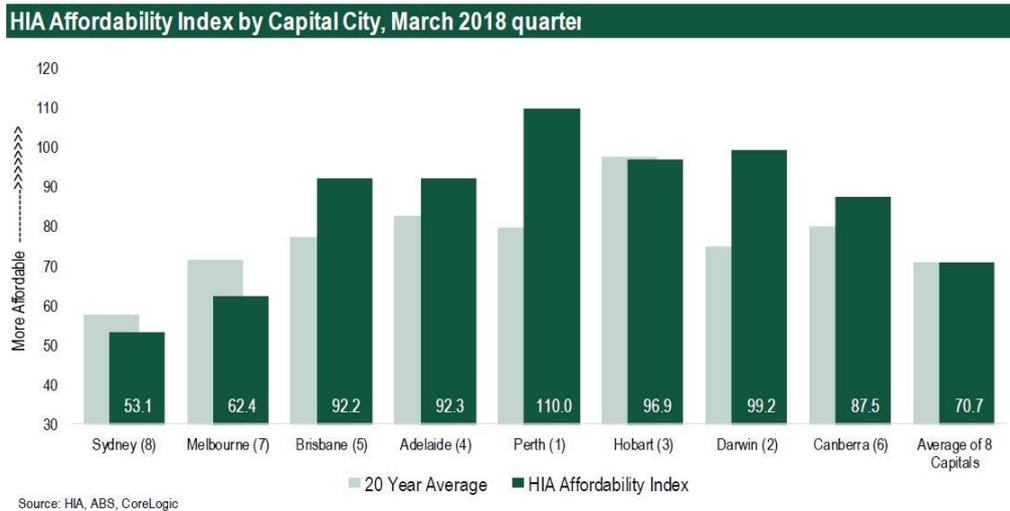
But it is the measure used by Moody's Investors Service, which claims that in Sydney at the March quarter 2018, 35.8% of household income was needed to meet mortgage payments, which was down 2.5% over a year. In Melbourne it was up 2% to 32%. In Adelaide over that year there was a slight worsening in affordability, while in Brisbane and Perth there was a small improvement in affordability. Affordability nationally was at an average of 28.2%.

The Housing Industry Association's (HIA) *Affordability Index*¹ takes a variation on this approach focusing on the average percentage household gross income of households in home ownership are paying in mortgage repayments. It does seem to be improving according to data

¹ In the HIA Housing Affordability Index a score of 100 means that 30% of earnings are absorbed by mortgage repayments, with 30% representing a supposed threshold for housing costs to still be affordable. Scores above 100 represent increasing affordability with less than 30% being absorbed by mortgage repayments, while scores below 100 represent declining affordability with greater than 30% being absorbed by mortgage repayments. The Index is calculated by dividing mortgage repayments by 30%, which gives the qualifying income. Then the Affordability Index is calculated by dividing average weekly earnings X 100 by the qualifying income.

for the March quarter 2018 (see Figure 4).

Figure 4: HIA's Housing Affordability Index, March Quarter 2018, for the capital cities



Source: UDIA (2018).

As reported by Ironside (2018b), for the March quarter 2018, the *HIA Index* showed that, over a 20-year period, Sydney had the worst affordability while the best affordability was in Perth followed by Hobart, Darwin and Adelaide. On this measure there is thus very wide variability in housing affordability between the metropolitan markets, with housing affordability only likely to be a problem in Sydney and Melbourne.

In the March quarter 2018, mortgage repayments in the metropolitan markets taken all together accounted for 42.4% of gross household income, considerably higher than the 30% threshold commonly used to signify affordability. The *HIA Index* also reveals volatility in markets with a 1.9% improvement in housing affordability in Sydney in the March 2018 quarter. Over the year to March 2018 there was an improvement in affordability of 9% in Darwin, 6.1% in Perth, and 3.1% in Sydney, while affordability went back by 11% Hobart, 5.1% in Melbourne and 2.65% in Adelaide. Such contradictory movements in different cities is not uncommon in the property cycle.

However, the problem with these percentage of income measures of housing affordability used by Moody's Investors Services and by the HIA is they do *not* explicitly focus on affordability for the lower income households that would struggle to meet mortgage repayments of more than 30% of household gross income, whereas higher income and many middle-income households would not be struggling to meet mortgage repayments in excess of 30% of household gross income.

Indeed, it is significant that RBA data shows a significant number of households are well ahead of the required schedule of repayments on their mortgage, indicative that many home purchasing households are not under housing cost stress. This would indicate these types of measures of housing affordability present a problem as it is evident that many households are voluntarily choosing to pay well in excess of 30% of gross household income in mortgage repayments either as a means of paying off the debt more quickly and/or as a housing preference choice to purchase a more expensive dwelling in a more desirable suburb, thus such households are well able to afford to do so and are not suffering experiencing an affordability problem.

However, the situation in the high cost markets – such as Sydney and Melbourne – is such that a significant proportion of home purchasers are having to – or are choosing to – pay a high percentage of gross income on mortgage repayments. For Australia as a whole, households with a mortgage were paying on average 31.6% of the median household gross income on loan mortgage repayments, but in New South Wales that figure was higher at 37.8 % (Razaghi, 2018).

But in most of the capital city and regional markets, this measure indicates that housing affordability for home owners is not such a problem - if one at all.

3.1.2. Housing Prices as a Multiple of Household Income

Significant variation exists between metropolitan markets in this ratio measure of median house prices to median household gross annual income, and that has always been the case. In some ways, the relatively long period (30 years) that many financial institutions now allow for the repayment in full of a mortgage does lessen the level of mortgage monthly repayments that would be the case compared with the common situation in past times when the period to fully discharge the mortgage was lower 20 or 25 years.

But it is true that the higher size of the deposit (often 30%) relative to the purchase price of a house now required by financial institutions (particularly the banks) compared to past times does operate to extend the time first home buyers must spend accumulating the deposit for a house thus delaying their entry into home ownership.

Nevertheless, it is also true that today, and for the last several years since the GFC, mortgage interest rates are at historic lows, particularly compared to past times when, for example, in the early and mid-1990, mortgage interest rates were very high (and pegged) at 15% for home purchasers. The current very low mortgage interest rates do offset to a considerable degree the longer time of the period of the mortgage loan and the size of it related to extremely high house purchase prices in some cities.

3.2. Measurement Approaches Developed and Used Officially in Australia

A comprehensive study by the National Centre for Social and Economic Modelling (NATSEM) outlined the approaches used officially in Australia to measure housing-related stress (Landt and Bray, 1997).

Two approaches seem to have been used, not only in Australia, but also elsewhere:

- a *proportional measure*, which sets housing costs as a fixed proportion – typically 25% or 30% of before-tax household income within set bounds – for the bottom 40th percentile of income units; and
- a *residual measure*, where housing costs are set as a fixed amount that does not vary with income level.

3.2.1 A Proportional Measure

From the 1980s in Australia, the National Housing Strategy (1991) has adopted the *proportional measure* approach identifying the population in rental housing likely to be affected by housing financial stress for low income households, what is referred to as the ‘30:40 rule’.

Derived from the Canadian Mortgage and Housing Corporation’s approach, this measure was also used in Australia by the Productivity Commission (1993), which in addition sought to incorporate the appropriateness of housing occupied by low income groups into a measure of housing affordability. That benchmark was adopted to ascertain eligibility for housing rental assistance and eligibility for accessing public rental housing.

The NATSEM study (Landt and Bray, 1997) also told how a *net affordability measure* can be applied to the ‘30:40 rule’ using disposable income. In addition, a *net equivalent disposable income measure* for the bottom 40% of income units might be used.

3.2.2 A Residual Measure

The *residual method* was followed by the Henderson National Commission of Inquiry into Poverty in Australia in the early 1970s. It used age and family-type groups with an after-tax income below the poverty line to identify the incidence of housing cost-related poverty. There was also experimentation with using a Canadian approach measuring core housing needs, which took account not only of the quality and appropriateness of housing – including its facilities such as number of bedrooms in relation to household size – but also of its location.

3.2.3. The ‘30:40 Rule’ as the Most Appropriate Benchmarked Measure

The most appropriate way to define and measure housing affordability is probably to adopt the international benchmark of household housing financial stress – namely the ‘30:40 rule’ – as a benchmark measure which states that a household is experiencing household housing-related financial stress if more than 30% of household gross annual income is being spent on mortgage repayments or on rent when the household is below the 40th percentile of the household gross annual income distribution.

This definition and measurement of household housing-related financial stress is the benchmark used across jurisdictions in Australia to determine the eligibility of a household to receive the Commonwealth/State rental assistance, and for a household to be eligible to have access to public housing and receive a subsidized rent.

However, Rowley and Ong (2012, p. 16) note that the blanket approach of the ‘30:40 rule’ can be problematic as this ‘one-size-fits-all’ approach:

... prevents policy application from recognising differences across housing markets, population groups and the stage of housing career a household is at. Policies that target the wellbeing agenda need to target the ‘experience’ of housing affordability, which is more wide-ranging than can be appropriately reflected by a binary indicator relating housing costs to income.

Nevertheless, it is this benchmarked ‘30:40 rule’ that is the most appropriate measure to use when discussing the incidence of lack of housing affordability in Australia. When used it results in a substantially lower incidence of housing unaffordability than is revealed by the other commonly used measures, especially those used for the various industry body affordability indexes. When the ‘30:40 rule’ measure is used, and when compared with past incidences of household housing-related financial stress in Australia overall, the current incidence of housing affordability on this benchmark measure is *not* particularly higher than in the past when taking a national aggregate perspective.

3.2.3. Mortgage Repayments Defaults

An indication of financial stress in the home purchase market is the incidence of home loan repayment defaults.

As reported in the *Australian Financial Review* (Shapiro, 2017, p. 30), evidence from Moody’s Investment Services indicates that just after the peak in the housing prices boom, the incidence of loans on prime mortgages more than 30 days overdue was in fact extremely low, falling from 1.62% at the end of the June quarter to 1.54% in September 2017. There were bigger improvements of that delinquency for loans originating from the shadow lenders, falling from 2.85% at the end of the June quarter to 2.59% at the end of September 2017. Even the performance of loans to ‘non-conforming’ or sub-prime borrowers also improved from 3.55% to 3.3% over that period. The protections afforded by mortgage insurance, along with the credit

enhancements investors in mortgage-backed securities receive, overall means there is very low risk from mortgage defaults.

The Moody's analysis suggested the strong performance of defaults was helped by a 10% increase in residential property prices to the end of the September quarter 2017, with the Moody's measure of housing affordability – measured by the average share of income required to meet mortgage repayments – declining from 28.7% to 27.4%.

Nonetheless, housing affordability has remained an issue, with research from the Australian National University indicating it was taking 139% of the household's annual income of aspiring home purchasers to accumulate a 20% deposit for a home, which was up from 86% in September 2010. And in Sydney that figure had jumped from 117% to 168%, which is indicative of the degree to which housing affordability is an issue dominated by the Sydney housing market.

However, the data do indicate that there is no sign yet that significantly more home purchasing households are battling to meet their mortgage repayments. But the stagnation in real income growth that has characterized Australia post-the GFC might become a factor if there are increases interest rates which some forecast in the next year or so.

4. WHAT THE AUSTRALIAN BUREAU OF STATISTICS SAYS ABOUT HOUSING AFFORDABILITY

So, what does the Australian Bureau of Statistics (ABS) say about housing affordability? Even when the housing prices boom was in full swing in 2015-16, ABS (2017) data showed:

- for home owners with a mortgage, the percentage of their gross household income spent on mortgage costs had fallen from 18% in 2011-12 to 16% in 2015-16;
- private renters were spending only 21% of their gross household income on rent, which had been remarkably stable since 2011-12; and
- State and Territory housing authority tenants also spent 21% of their gross household income on rents, which was also unchanged from 2011-12.

Indeed, over the 20 years from 1995-16 to 2015-16 there was remarkable stability in proportion of gross household income being spent on housing costs for these tenure groups.

But the ABS data do show that over the longer term (1995-96 to 2015-16) there had been some adverse changes in housing affordability, but they were not great. In 2015-16:

- 75% of households spent 25% or less of their gross household income on housing costs, a decrease from 80% in 1995-96;
- 7% of households spent between 25% and 30% of their gross household income on housing costs, an increase from 6% in 1995-96;
- 12% of households spent between 30% and 50% of their gross household income on housing costs, an increase from 10% in 1995-96; and
- 6% of households spent more than 50% of their gross household income on housing costs, an increase from 4% in 1995-96.

The ABS data show there were significant geographic differences in the average ratio of housing costs to income between some States and Territories when compared with the national average. For example:

- for all households in 2015-16, housing costs as a proportion of gross household income in Queensland (15%) were significantly higher than the national average (14%), whereas those in South Australia (13%), Tasmania (13%), and Australian Capital Territory (13%) were lower;
- the housing costs as a proportion of gross household income for renters in the Northern Territory (18%) were lower than those for all households in Australia (20%); and
- for owners with a mortgage, the housing costs as a proportion of gross household income were higher in Victoria (17%) than those for all households in Australia (16%) whereas those for the Australian Capital Territory (15%) were lower;

What the ABS data reveal is lower income households – defined as those containing the 38% of people with equivalized disposable household income between the 3rd and 40th percentiles – have lower housing costs on average than all households, but their housing costs of \$345 a week represented a greater percentage of their gross weekly income at 28%. However, lower income households renting from private landlords paid an average of \$322 a week on housing costs, which represented 32% of their gross weekly income. Using the ‘30:4 rule’ to measure rental stress, in 2015-16, just over half (51%) of lower income renter households were in rental stress.

There will always be a sizable number of low-income households who simply will not be able to afford to enter the home purchase market because of their temporary or long term socio-economic circumstances relating to factors such as unemployment, disability, family breakdown, and family violence. It is these households that warrant greater policy attention. Such highly disadvantaged households are the ones locked out of home ownership and will be dependent on eligibility for rent assistance under the Commonwealth-States housing assistance programs. But rental assistance programs do not give proper attention to the empirical fact that the level of rents vary widely between and across our cities, and the level of rent assistance is not properly adjusted to reflect those spatial differences.

5. THE PLIGHT OF FIRST HOME BUYERS

Not surprisingly much of the discussion on housing affordability focuses on first home buyers, with concerns being expressed for their plight in entering the owner-occupied market, especially in the high cost Sydney and Melbourne markets.

The arguments that first home buyers are being locked out of entry to home ownership by unaffordable prices has often become somewhat extreme – even emotional – amid claims it represents what former Liberal Opposition Leader, John Hewson, has described as “intergeneration theft” (as reported by Razaghi, 2018, of *Domain*). Hewson said:

.... We haven’t had a government prepared to stand up to set a medium-term policy agenda in any area and seek to deliver it.” [that is, affordability of housing]

.... Problems don’t get solved ... they get kicked down the road.

The proportion of loans for the purchase of housing by first home buyers had declined markedly from well over 20% in 2011 to a low of 12.9% in mid-2017, but it has since rebounded to 18.5% in September 2018 to top 104,000 loan approvals – the highest number since 2009 – in what is now a softening residential property market, especially in Sydney but also in Melbourne. Analysis of ABS data by CoreLogic shows that in New South Wales 2,046 first home buyer mortgages were written in February 2018, up from just 1,105 a year earlier, and in Victoria there was an increase of 38.6% in mortgages for first home buyers.

Redman (2018c) tells how in the March quarter 2018, real estate agents in Melbourne and Sydney were reporting an upsurge (for the first time in several years) in first home buyers

bidding at auction sales, especially in the more affordable segments of the market in the outer suburbs of those cities, and in Geelong as well in Victoria. That bidding-up was seen by agents to be being driven by access to generous grants and stamp duty concessions State government were providing to first home buyers. It has been a common phenomenon to happen with public policies supporting first home buyers which are providing grants or concessions that can be as high as \$26,000. The inevitable result is a bidding-up of the market, negating the supposed advantage the policy was meant to give easing the cost of accessing the first home buyer market.

As discussed by Uren (2018a), this substantial rebound in first home buyer activity re-entering home purchasing since mid-2017 might reflect the easing that has been occurring in home purchase prices, which has been about a 5.4% drop in the Sydney market. And it also might be reflecting the substantial subsidies to first home buyers provided by State governments to encourage young first home buyers into the market with Victoria exempting them from stamp duties on properties up to \$600,000 while in New South Wales the exemption is on properties up to \$650,000.

It is, however, noteworthy that credit growth to home occupiers continues to remain steady at 7.5%.

Nonetheless, all of this does indicate a marked shift is now occurring away from what had been a decade long period of an investor-driven residential property purchasing.

It is important to understand that over many year governments – both Commonwealth and State – have introduced on multiple occasions first home buyer assistance schemes which have varied from straight payments bonuses to concessions on stamp duties. And it seems they will continue to do so as a reaction to housing affordability issues to assist aspiring first home buyers struggling to get into the market during the up-swing phase of a residential property boom

However, the evidence is that providing grants and concessions to assist first home buyers usually results in a further driving-up of housing prices and encourages upwardly mobile young workers to enter the market earlier than they might before they do not meet an income threshold that often applies to those loans. That was found to be the case back in the 1980s when the Hawke Labour Government introduced its First Home Owners Scheme (FOHS) as demonstrated in the evaluation of that scheme by Beed, et al (1989). And later in 2004 a Productivity Commission (2004) inquiry into first home ownership along with subsequent investigations by the Commission showed grants to first home buyers did little if anything to improve affordability and their accessibility to home ownership, with the increase occurring in housing prices being as great up to five times the size of the cash grant or stamp duty concession provided by a government. The real beneficiaries tend to be elsewhere that the first home buyer.

6. WHAT ABOUT PRIVATE RENTERS?

In discussing housing affordability, specific attention needs to be given to the plight of private renters who are dependent on investors in housing to keep up the supply of private housing.

There has long been discussion on the affordability of private rents in Australia (see, for example: Paris, 1884; Wulff, 1997; Wulff and Maher, 1998), with a sizeable but minority proportion private renters claimed to be experiencing housing costs stress. But it does need to be recognized that lower-income eligible households do have access to Commonwealth-State rental assistance which is meant to subsidize rents for eligible households keeping the cost for them to 30% of gross household income, which can alleviate the issue to some lower income private renters. At least that is the intention of the rental assistance program, but it depends on where people live.

Historically in Australia the private rental sector has been a transitional tenure (Kendig, 1984). But that has shifted over the last two decades. Stone, Burke, Hulse and Ralston (2013) and Hulse, Morris and Pawson (2018) have estimated at least one in three private renters are long-term or even life-long renters.

As with home owners, the proportion of low-income private renters in housing stress has increased dramatically. Wood and Ong (2017) estimate that, in 2013, 68.7% of low-income private renters used more than 30% of their income on rent payments (which 2016 census data showed to be 62.6%), a very substantial increase from what it was back in 1983 at 40.9%. Stone et al. (2013) claim that more than 20% of low-income long-term renters are regularly paying more than half of their income on rent. This is shown to apply especially to long-term renters, who are a “significant and growing” part of households in Australia (Stone *et al*, 2013, p. 2). They now well-and-truly out-number the number in public/social housing and have done increasingly since the late 1980s. Long-term renting – that is, for 10 years or more – now accounts for one-third of the private rental sector compared with about 27% back in 1994 (Stone *et al*, 2018, p. 44).

Commonwealth Department of Social Security (DSS) data shows that of the 552,500 recipients of all forms of Commonwealth transfer benefits who were also recipients of rental assistance, some 42% were paying more than 30% of household gross income on rent, with 13% paying more than 50% in rent. As reported by Morton (2018), the data show of the 174,000 recipients of New Start (unemployment) benefits who were receiving rental assistance whose rental on average was \$113 per fortnight, around 61% of them were paying more than 30% of household gross income on rent, with almost one-quarter paying more than 50% of gross income on rent.

The DSS data also show 31% of the 89,000 age pension recipients who are renting were paying more than 30% of gross household income on rent.

The DSS data highlight how it is young people on benefits where the rental “crunch is hardest” (Morton, 2018, p. 10), with 58% of those aged 18-24 years suffering from rental financial stress paying more than 30% of gross income on rent, and for a quarter of them they are paying more than 50% on rent. The other rental group that is also most impacted by rental stress is those approaching and in retirement. Those figures are about the same for recipients of disability support payments along with rent assistance. One-third of age pensioners receiving rent assistance are paying more than 30% of household gross income on rent, with 10% paying more than 50% on rent.

The DSS data reveal the States/Territories where the pressure on housing costs for private renters receiving benefits is greatest in the ACT, followed by Western Australia and New South Wales.

For Sydney and Melbourne, the plight of renters seems particularly marked, with Hulse, et al. (2014) using the ‘30:40 rule’ measure to estimate that, in 2011, 80% of the lowest two income private renters living in unaffordable housing. The shortage of affordable and available rental stock in Sydney in 2011 for Q1 private renters was 52,600 and 92% were paying unaffordable rents (almost all the Q1 households would be dependent on government benefits for their income). And for Q2 households that are dependent on the PRS there was a shortfall of 40,500 affordable and available rental stock in Sydney and 55% were in housing stress.

Anglicare (2018, p. 6) paints a bleak picture of Sydney’s rental market for households that are dependent on government benefits or the minimum wage:

... Sydney stands out for the extraordinary crisis in affordability revealed in this year’s data – there were no affordable and suitable properties for any household type, with the exception of a

couple where both are earning minimum wage, and for them, there was just 4% of properties available.

The latest *Rental Affordability Index* (RAI) shows that in Greater Sydney a single person dependent on the age pension for their income would use 94% of their income to pay for a one-bedroom dwelling, and a couple 54%. In the rest of New South Wales, single age pensioners would be use 38% of their income for rent and 28% for a couple (SGS Economics and Planning, 2018).

Thus, the plight of private renters and the level of rents is an important issue affecting housing affordability for many households across Australia, and like house prices for owner-occupiers, there is substantial geographic variation in the level of rents and trends in them. And there will be significant variations in rental property vacancy rates. That is evident from the data for the capital cities in Table 5.

Table 5: Capital City Rental Housing Vacancy Rates and Level of Rents, August 2018

Capital city	Vacancy rates	All houses: Average level of rent to enter the market	All houses: % change over the last 12 months	All units: Average level of rent to enter the market	All units: % change over the last 12 months
Sydney	2.8%	\$706	-3.1%	\$515	-0.8%
Melbourne	1.6%	\$523	+3.03%	\$411	+3.1%
Brisbane	2.9%	\$452	+1.9%	\$370	+0.5%
Adelaide	1.3%	\$383	+2.2%	\$299	+2.6%
Perth	4.0%	\$423	+0.2%	\$324	-1.2%
Canberra	0.8%	\$625	+11.7%	\$437	+4.3%
Hobart	0.8%	\$400	+8.4%	\$360	+10.2%
Darwin	3.4%	\$518	-2.4%	\$403	-0.7%
National	2/2%	\$433	+1.9%	\$365	-1.7%

Source: SQM Research.

Many private renters would qualify for social housing if it was available, but they remain trapped in private rental stress. Wood and Ong (2017, p. 202) estimate almost 900,000 households currently renting from private landlords satisfy the income eligibility limit for access to public housings. A little more than 650,000 have one or more person(s) aged over 64 years of age or one or more person(s) with a long-term health condition or disability or house one or more school-aged dependent children (ibid):

... These are households generally thought to want the secure housing tenancies that public housing offers, rather than the short-term leases typical in Australian private rental housing.

However, some industry analysts (such as Scutt, 2018) are claiming renting is becoming more affordable with the share of household income being spent by private renters seemingly falling in the capital city markets except for Hobart.

7. THE COMPLEX MIX OF FACTORS IMPACTING HOUSING PRICES AND AFFORDABILITY

Many factors relating to both *demand* and *supply*, along with *institutional factors*, impact housing affordability in Australia. They are discussed in the sections that follow.

7.1 Demand Drivers

7.1.1 Population Growth and Household Formation

Housing *demand* is driven largely by the aggregate increase in population, which is attributable both *natural increase* and *immigration*, that typically translates into household formation and drives demand for new housing. Geographically, it is also driven by inter-regional internal migration, and this has been significant for Melbourne in recent years, but not for Sydney which continues to experience net internal migration loss.

With population growth and new household formation rates tending to outstrip the increase in housing supply in recent years, the upward pressure on housing prices is exacerbated, especially in areas where the absolute growth and the rate of growth in population and household formation are high.

But housing demand is also driven by demographic shifts related to transition through the life-family cycle, and geographically those demographic factors vary markedly playing out differently across the nation's cities and regions and within the big cities.

Between them Sydney and in Melbourne – which now actually has the highest level of population growth among the capital cities – account for some 70% of Australia's population growth. That represents 39% (+527,200) and 29% (+392,000) respectively of the population growth in the metropolitan cities between 2011 and 2016. It is thus those two cities that are the main drivers of demand for new housing and where housing affordability is worst.

Rapid population growth – especially in Sydney and Melbourne – is thus the main driver of what has been until very recently a booming housing market placing upward pressure on prices, not just in inner-city areas, where there has been a boom in apartment construction – with population densities in parts of inner-city Melbourne reaching 19,000 people per square kilometer – but also in the outer suburbs. For example, in Camden in Sydney's outer south-west where the population is growing fast, there is more 'affordable' housing at around \$800,000, which is still very high and could hardly qualify as being 'affordable'. So, the upward pressure on housing prices has spread across the Sydney metropolis. However, in Melbourne's outer west/south-west some 30km from the CBD, land/housing packages are affordable at about \$400,000.

7.1.2 Is Immigration the Culprit?

Population growth in Australia is high for a western society, but it is the high level of immigration that accounted for 54% of total population growth over the two decades from 1996 and 2016. That comprised both permanent immigrants, whose target numbers are set by the Commonwealth government, and those entering under short-term work and student visas, categories that have grown very substantially over the last decade.

In recent years immigration has been running at an historic high level, and it has been since 2005 when the Howard Coalition government doubled the annual intake from 100,000 to 200,000. That has resulted in an annual increase in population of around 350,000, placing extreme pressures on housing demand and thus prices, and placing pressure on urban services and infrastructure, generating congestion, and impacting quality-of-life.

That is especially so in Sydney and Melbourne – the nation’s most diversified labour markets and where house prices are highest – which are where 87% of new immigrants currently are choosing to live. In Melbourne net overseas migration accounts for two-thirds of the metropolitan area’s population growth, resulting in an increase of some 80,000 people a year out of a total increase in population of around 125,00 a year. The net internal migration gain was +9,000 in 2017. In Sydney there are an additional 84,000 migrants arriving a year, while that city continues to experience net internal migration loss, which was -18,100 people in 2017.

While the driver of demand for additional housing supply is a result primarily of the permanent immigration quota set by the Commonwealth government, it is also an outcome of Commonwealth Government visa policy which has been generating high numbers of temporary migrants enticing full-fee paying students to study in Australia (education is now the nation’s third biggest export industry) and attracting short-term migrants to fill areas of skills shortages in the labour market. The big majority of those short-term or temporary immigrants are on student visas and are highly concentrated in specific locations within the big cities - and especially Sydney and Melbourne - largely in and around the CBD. This has been a significant factor in driving the apartment construction boom and being linked to foreign investment in some of the inner-city apartment projects.

As the most significant component of population growth, immigration is thus a key driver of the aggregate level housing demand and it has been a factor driving up housing prices. It has been for a long time. The level of immigration is a major policy lever in the hands of the Commonwealth government which sets the annual immigration quota. It is really the only significant policy lever the Commonwealth government has regarding housing demand, while it is the State governments, and to a lesser extent local Councils, that are responsible for the policy levers that affect levels of housing supply.

As Australia’s population recently topped 25 million, the high level of immigration has become a hot issue attracting much debate and media commentary, as well as the attention of politicians. This is resulting in calls to cut the level of the annual intake, with a former Prime Minister, Tony Abbott, in various speeches, claiming that “... the issue is not immigration; it’s the rate of immigration at a time of stagnant wages, clogged infrastructure, and soaring house prices” (quoted in Kohler, 2018, p. 37).

The Commonwealth Government is now looking to initiate an inquiry into formulating a national population policy, with suggestions of there being interventions to divert immigrants to settle in capital cities other than Sydney and Melbourne and Southeast Queensland, directing them to settle in the other capital cities and in regional areas for at least five years, supposedly to alleviate demand on housing and ease congestion in Sydney and Melbourne. But it is highly doubtful such policy measures would work in the longer-run.

It has long been held that there are economic benefits of immigration. In the past year some two-thirds of the nation economic growth has been attributable to population growth with most of it derived from immigration, with claims that cutting back on immigration would cost the federal budget \$5 billion a year. While immigration certainly fuels domestic demand, it has undoubtedly spilled over into driving-up housing prices, particularly in those markets that are the main destination areas to which the immigrants are attracted.

7.1.3 Foreign Investors Purchasing Housing

It has also been claimed in some media commentary in recent years that foreign investors purchasing residential real estate has been another factor fueling housing demand and driving up house prices, especially in Sydney and Melbourne.

Foreign investment in housing is regulated by the Foreign Investment Review Board (FIRB) which tends to limit purchases by foreigners to new dwellings. In 2016-17 a total of 40,100 residential property purchases by foreigners were approved by the FIRB, with Chinese investors being the largest group. But it has since dropped markedly for a number of reasons, including capital controls, restrictions on bank finance to foreign purchasers, and surcharges on foreign buyers levied by State governments, along with tighter controls by the Chinese government on the transfer of funds out of the country and reduced credit to off-shore buyers by banks in China.

The evidence as to what has been the degree of the impact of foreign purchases on housing prices (if any) is, however, scant. And at any rate, it is evident that such foreign purchasing is spatially specific, being concentrated largely in the inner-city apartment market and in more up-market suburbs where house prices are high and are already unaffordable for many middle- and for lower-income households.

7.1.4 Negative Gearing and Investor Activity

Some researchers (such as Daley, 2016) and some media commentator, along with Labor and Greens politicians, claim negative gearing is a significant factor in fueling the increase in housing prices.

Australia has long permitted so-called ‘negative gearing’ on investment, and it is not alone in doing so internationally. It allows residential property investors to off-set the costs of the rental property, including mortgage interest payments, against not only the rental income received but also other income. Tax incentives on investors in housing in Australia are thus “... strongly geared to capital gains rather than rental yield and contribute to volatility in the investor market” (Uren, 2018b, p. 23).

It is certainly true that during the housing property boom the incidence of property sales to investors had been on the rise, while the incidence of property purchases by first home buyers had dropped to a historic low in recent years, again especially in Sydney and Melbourne. The incidence of investors in the housing purchase market had been rising at an annualized rate of over 11%, with investors accounting for a high of 45% of new mortgages nationally in late 2014 – and up to 60% in Sydney – which was considerable higher than the previously normal level of around one-third. It is highly likely that high level of housing demand by investors was a factor in driving up prices, especially in the Sydney market, with modelling undertaken by KPMG suggesting that in that market a 10% increase in lending to investors translated into a 2.2% increase in prices (reported in Uren, 2018). But since then investor activity has been on the wane, driven in part by interventions by the RBA instructing banks to tighten credit and lending requirements.

Negative gearing is being blamed as not only a factor driving up housing prices, but also as benefiting the rich at the expense of the poor (Hutchens, 2017). However, the evidence is that, among the 1.3 million or so investors in rental properties, there are huge numbers of lower- and middle-income ‘Mum and Dad’ investors in taking advantage of negative gearing, mainly having one investment property. They are certainly a diverse lot, with the top 10 occupational groups (numbering from 72,000 to 320,000) doing so being CEOs and senior managers, teachers, IT workers, engineers, other managers, nurses and midwives, retail workers, office/practice managers, people in advertising and marketing, and general clerks. Most (70%) have only one rental property negatively geared. Australian Taxation office data shows that 62% of investors in rental properties who negatively gear have incomes of less than \$80,00 a year; thus, the big majority are far from being rich.

Recent quantitative modelling of the impact of negative gearing on the housing markets by Cho, Li and Uren (2017, p. 1) suggests eliminating negative gearing would:

... lead to an overall welfare gain of 1.5% for the Australian economy in which 76% of households become better off. However, the welfare effects are heterogeneous across different households. Renters and owner-occupiers are winners, but landlords, especially young with high earning landlords, lose.

Its axing might have some positive effects, but they are likely to be not very significant for improving affordability. For example, writing in the *Sydney Morning Herald*, Peter Martin (2018) reports on claims that, according to a paper presented to an RBA conference, axing negative gearing would "...lift home ownership to as much as 72.2 per cent of households, cut home prices by just 1.2 per cent and lift rents 'only marginally'".

The Federal Labor Opposition has announced that in government it will eliminate negative gearing, except on new properties, while 'grandfathering it for existing investors. Labor claims it will only impact better-off investors while supposedly raising about \$20 billion in taxation revenue over time. Labor also intends to reduce the investor concessions on capital gains tax from 50% to 25%. And the Greens want to totally axe negative gearing.

The arguments for eliminating or at least placing restrictions on negative gearing that are based on the supposition it drives up housing prices and are inequitable are contestable. The existence of negative gearing does keep up the supply of rental housing helping keep level of rents lower than they might otherwise be. The majority of investors taking advantage of negative gearing are lower- and middle-income households, not the rich. The empirical evidence under the decision (albeit short lived) of the Hawke Labor Government in the mid-1980s to eliminate negative gearing was to precipitate a withdrawal of investors in housing and a dramatic increase in rents, particularly in the Sydney market. Considerable caution needs to be exercised in intervening to alter negative gearing arrangements as unintended consequences are likely to be precipitated.

7.2 Supply Factors

In the housing affordability debate, it is important to understand the factors affecting housing and land supply.

7.2.1. The Dwelling Shortage

It has been widely held that Australia has a dwelling supply deficit.

Data compiled by the UDIA (2018) shows the shortage of dwellings in Australia peaked at 228,000 in 2011 and it has since been reduced to around 100,000 annually. That is still a high figure that could again increase given the current rate of population growth and the increasing concentration of that growth in the major capital cities. While that was an increase of only 2% on 2016, it was an increase of 51% on the 2014 output. Melbourne led with 49,000 lots and multi-units produced in 2017, an increase of 89% in 2014. Sydney produced much less new supply at 37,740. The increase in supply was a record 25,200 in South-east Queensland and about the same in 2016, up 48% on 2014. Adelaide added 4,300 lots and multi-units, an increase of 12% on 2016. Canberra produced more new supply than Adelaide in 2017 despite its population of only one-third of that city. But in Perth there was a sharp retraction to 11,900 new supply in 2017.

The UDIA (2018) data shows in 2017 a combined total of 132,600 new dwellings were built across the major capital cities, an historical high, but still below what is needed to cope with the level of population growth being experienced. Some 65% of that new release was in Sydney and Melbourne, with 19% being in Brisbane.

The 2017 data for greenfield housing, new land releases in the metropolitan regions and median lot prices are shown in Table 6. Analysis by the UDIA reveals that given constraints imposed

by planning policies and zoning schemes, the development industry is supplying what are record levels of greenfield land releases, adding a combined total of 132,600 new housing lots in 2017. While that was up only 2% on 2016, it was a large 51% increase on 2014.

Table 6: New Lot Releases, Median Lot Values, and Trading Months of Stock in the Metropolitan Regions, 2017

Metropolitan region	New releases 2017	Median lot prices (\$)	Trading months of stock at December Quarter 2017
Sydney	9,411	476,000	1.1
Melbourne	22,990	281,000	0.6
South-east Queensland	13,268	264,000	3.3
Adelaide	2,262	167,000	5.3
Perth	6,885	227,000	7.7
Canberra	557	430,000	4.7

Source: UDIA (2018).

Sydney, the city with the least affordable housing, had an extremely low number of new lot releases (only 9,411), indicating a significant shortage of supply. The second highest priced market, Melbourne seems to be releasing a more reasonable amount of new new lot supply (22,990), as does South-East Queensland (13,268) and also Perth (6,885) relative to their sizes. Sydney is by far the highest cost market for median lot prices (\$476,000), and it is also very high in Canberra (\$436,000), while the cost is very much lower in Melbourne (\$281,000). The data reveals there must be some supply and cost inefficiencies in the Sydney market, while Melbourne is performing much more cost-effectively, as is SEQ.

Perhaps ironically, lot sizes have been declining for some time increasing residential densities in greenfield developments, while median lot prices have been on the increase.

Provision of supply in the multi-unit market seems to have been much better (see Table 7). There has been a dramatic increase in new supply in recent years, rising from 47,313 in 2014 to 77,365 in 2017, indicative of the considerable push in metropolitan planning schemes that encourage - even mandate - urban consolidation, including urban in-fill. This covers a wide range of housing types - apartments/flats/units/multi-units/row/terrace/townhouse, aged care/retirement villages/retirement and student housing. Their supply is overwhelmingly concentrated in the inner-city areas of the big cities. In Sydney:

- 21% are in the inner-ring 5km from the centre of the CBD;
- 33% are within the 5km-10km ring;
- 28% are within the 10km-20km ring; and
- 18% are beyond 20km.

In the other big cities, the concentration of multi-unit housing is even much more concentrated within the 5km ring from the CBD.

There is a lot of talk about a pending over-supply of new units, especially with what is in the development pipeline, and particularly in Melbourne and Brisbane, given the large number of active new multi-unit projects there. Unit vacancy rates are certainly high in some of metropolitan markets, and especially in Perth, Melbourne and Adelaide.

The UDIA (2018) makes the point that:

... The varied 2017 performance of the nation's major housing markets in terms of adding new supply all retained a common feature - rising affordability pressures. Deteriorating housing affordability continues to present a wicked public policy issue for government while also presenting a major challenge for the development industry.

Table 7: Multi-Unit Supply and Cost Data, December Quarter 2017

Metropolitan city	New unit completions	Active projects at December Quarter (approved and under construction)	Median sales price of new units (\$)	Vacancy rated at December Quarter
Sydney	28,330	1,383	710,000	3.8%
Melbourne	25,900	1,302	515,004	5.6%
Brisbane	11,900	423	430,000	4.9%
Adelaide	2,130	126	414,000	4.0%
Perth	4,990	262	400,000	6.8%
Canberra	4,100	61	494,975	3.5%

Source: UDIA (2018).

7.2.2 Institutional Issues, Including the Impacts of Planning and Zoning Policies

The development industry is highly critical of government policies that impose delays and increase costs for the provision of new housing, causing restrictions on housing supply. For a couple of decades, researchers and some official reports have laid the blame on planning and red tape and compliance practices, including the push by State governments and local Councils to encourage and facilitate urban consolidation and 'smart growth' and urban containment policies (see: Troy, 1990; Shaw and Houghton, 1991;; Wiggins, 1992; Nelson, 2000; Yates, 2001; Productivity Commission, 2003; Menzies Research Centre, 2003; Carlson and Mathur, 2004; Oxley, 2004; Searle, 2004; Moran, 2005; Cox, 2008;Gurran, 2008; Commonwealth of Australia, Housing Affordability Fund, 2008; Taylor, 2009).

Inflexible planning policies and zoning schemes are framed and imposed by State and Territory governments and by local Councils, and how they are being exercised has impacts on the nature of the provision of new housing and how it is delivered, often operating to restrict new housing supply. There have been adverse outcomes for house and apartment development approval processes and costs, exacerbating housing affordability. That is despite concerted attempts, particularly in metropolitan strategic plans over the last couple of decades or so advocating and facilitating urban consolidation and densification the big cities.

But metropolitan strategic plans across the capital cities have varied greatly in the extent to which they have facilitated fringe development and encouraged urban consolidation. The Carr Labor government in NSW in the 1990s and early 2000s was particularly involved in declaring Sydney to be 'closed' for fringe development, restricting the release of land and thus restricting new housing supply. In contrast, governments in Victoria have been active in facilitating new land release for fringe development in Melbourne, promoting the provision of affordable land-housing packages on Melbourne's west and north

'Smart growth' policies embodied in metropolitan plans, and planning policies and practices – including inclusionary zoning – in general, have certainly had unintended consequences, such as displacing low-income households, and in general they have failed to deliver more affordable housing, imposing holding costs and delays.

In general, urban consolidation facilitating medium and higher density housing development and mixed-use redevelopment across inner-city areas has become widespread, with a significant increase in the proportion of new housing provision now being flats, apartments and town-houses. But that does not mean the outcome of urban consolidation has been a significant increase in the provision of new affordable housing.

Local government zoning policies and practices have tended to restrict the new supply of medium and higher density housing, especially in the middle suburbs of the metropolitan cities, that being done in response to what has been called ‘NIMBY-ism’ that leads to the restriction of, and delays in the provision of new housing. For example, in Melbourne the maintenance of the ‘neighbourhood residential zone’ by local councils across swathes of the middle suburbs. In and across large parts of Sydney the ‘R2 low-density residential zone’ and restrictive floor space ratios restrict multi-unit developments, with such restrictive zoning tending to push new housing development to the fringe areas of the city where a large part of the increase in population is housed, remote from employment centres and poorly served by public transport.

A recent RBA report (Kendell and Tulip, 2018) – which attracted considerable attention in the media (see Creighton, 2019; Sloan, 2018) – estimates the cost of zoning and density restrictions is ramping-up the cost of housing in the major cities (see Table 8) and has been doing so since the early 2000s. It is estimated the zoning effect on the cost of a house in Sydney is \$489,000, which accounts for 42% of the cost of an average house that is \$1,160,000. For Melbourne the zoning effect is \$324,000 (41%); for Brisbane it is \$159,000 (29%); and for Perth it is \$206,000 (35%).

The estimated impact of zoning related costs on the price of a house is thus very substantial, with RBA report concluding that “... the reason land is expensive is not because it’s physically scarce” (Kendell and Tulip, 2018).

Table 8: Average House Prices Breakdown in Sydney, Melbourne, Brisbane and Perth

	Sydney \$ (%)	Melbourne \$ (%)	Brisbane \$ (%)	Perth \$ (%)
Dwelling structure	\$395,000 (34%)	\$268,000 (34%)	\$267,000 (49%)	\$242,000 (41%)
Land	\$765,000 (66%)	\$525,000 (66%)	\$275,000 (52%)	\$346,000 (59%)
<i>Physical land</i>	\$276,000 (24%)	\$201,000 (25%)	\$116,000 (21%)	\$340,000 (24%)
<i>Zoning effect</i>	\$489,000 (42%)	\$324,000 (41%)	\$159,000 (29%)	\$206,000 (35%)
TOTAL	\$1,160,000	\$793,000	\$542,000	\$588,000

Source: Creighton (2018), after ABS data.

In Sydney the inherent value land is about \$400 per square meter implied by the actual sale value, or \$277,000 for an average block instead of the actual cost of \$765,000. Kendell and Tulip’s (2018) analysis suggests:

... development restrictions have contributed materially to the significant rise in housing prices in Australia’s cities since the late 1990s, pushing prices substantially above the supply costs of their physical inputs.

The RBA report also suggests the zoning effect has made apartment prices in Melbourne and Sydney between \$110,000 and \$399,000 more expensive increasing prices to around \$700,000 and \$1,500,000. It advocates for making zoning restrictions (Kendell and Tulip, 2018):

... less binding directly (e.g. increasing building height limits) or indirectly, via reducing underlying demand for land in areas where restrictions are binding (e.g. improving transport infrastructure) could reduce this upward pressure on housing price.

It also suggests that "... as zoning regulations become more binding and contribute to increases in property prices, they represent a wealth transfer from future home buyers to current home owners (and) result in higher rents".

But the RBA figures are challenged by some economist, with columnist Sloan (2018, p. 12) claiming they are based on some questionable assumptions. Sloan makes the valid point that planning and policy 'zealots' advocating the densification of existing urbanized areas in the big cities are ignoring the legitimate rights of existing residents of lower density housing over how their suburb is developed given the existence of the long-standing current residential zoning of those areas.

Another valid point made by Sloan is that the push or densification of the inner and middle suburbs – which has been in fact occurring under State planning schemes and local Council interventions – is that there is often inadequate provision of infrastructure and services, including parking, to deal with the increased population that occurs through urban consolidation. So, this densification push is a vexed issue.

The HIA Chief Economist, Shane Garrett proposes "... governments need to focus on solutions involving lower land costs, a more nimble planning system and a lighter taxation burden on new home buyers" (quoted by Ironside, 2018b). However, as pointed out by Taylor (2009, p. 14), the impacts of planning can "run in both directions", with some research suggesting that it is booms in residential markets that tend to focus more attention on the adverse impacts of planning issues,

7.2.3 Development and Property Industry Practices

Another factor claimed to impact housing affordability is the behaviour of some in the development and building industry.

It is not uncommon for developers to engage in 'land banking' practices which involves the purchase of land at today's prices with the intent to have the land rezoned for urban development and then released and developed at the whim of the developer. It does of course involve delays associated with the rezoning and development approval processes exercised by local Councils, and it does require the developer providing the required infrastructure.

Land banking to 'hoard land' may result in developers delaying or controlling the rate of release of new housing lots in developing their land holdings slowing down the development and release of serviced blocks for greenfield housing development which can push-up prices in a time of high demand for such housing, thus helping the developer to make a bigger profit, especially in a rising market. It can also result in developers going bust in the down-market phase of the residential property cycle, so there are risks involved.

But whether land banking by developers is a significant factor in restricting housing supply is somewhat problematic as usually a developer wants to minimize holding costs. Nevertheless, the Commonwealth Government recently introduced a 'tax integrity' measure to abolish expenses associated with holding land to discourage the practice.

7.3 Other Institutional Factors

7.3.1 State/Territory Stamp Duties

State and Territory governments levy stamp duty charges on property purchases that are substantial and add considerably to the price of housing for both owners and investors. Driven

by the residential property boom, stamp duties have been a revenue bonanza for State and Territory governments, doubling their revenues from stamp duties to around \$20 billion in 2015 over just four years.

Over the years, researchers (including Wood, Ong and Winter (2012) have investigated the impact of stamp duties. They certainly add substantially to the price of purchasing residential property. Stamp duties are not only a cost impost on first home buyers and investors in rental properties, but also can act as a disincentive for ‘empty nesters’ and other home owners to downsize or upgrade and move to another location, freeing-up housing through increased residential mobility.

7.3.2 Developer Levies/Charges

State governments and local Council imposed developer levies/charges have also played a significant role in pushing up house prices. Such charges typically have an impact of anywhere between 25% and 49% in adding to the price of a serviced block for new housing, depending on the jurisdiction. In addition, typically lengthy and convoluted planning and development approval processes substantially impact the price of new housing. Developers pass on all those cost imposts to the purchaser of new housing.

RBA research (Kendell and Tulip, 2018) estimates the impact of zoning and other regulations have raised detached house prices by 73% above marginal costs of supply in Sydney, 69% in Melbourne, 42% in Brisbane, and 54% in Perth. In the already highest cost market of Sydney, this impact is exacerbated.

The combined effect of these institutional imposts on developer levies in developing greenfield land and on redevelopment site housing developments and of stamp duties on property transactions is to very substantially increase the cost of housing and probably are the greatest impact on housing affordability.

The UDIA (2018) concludes:

... Taxes and charges remain high with some government’s foreshadowing further levies on development. This must be avoided if government is serious about maintaining the economic stimulus from the residential home building sector and improving long term housing affordability.

7.3.3 The Cost of Building

A significant impact on housing affordability is the cost of producing new houses in Australia as well as the cost of producing medium and higher density housing. It is an empirical fact that there is a most significant variation in the per square meter cost of construction of housing. Industry sources suggest that in 2015:

- the cost of construction per square meter for a standard 3-bedroom stand-alone house in Australia average about \$1,500, varying from a low of \$1,353 in Melbourne to a high of \$1,750 in Darwin;
- the cost for a three-level walk-up unit was about \$2,275 and for a town house it was about \$2,275;
- but for a low-rise apartment it ranged from about \$18,000 in Brisbane to \$2,100 in Sydney and for a high-rise apartment it ranges from about \$2,500 in Brisbane to \$2,900 in Sydney.

It seems the costs of dwelling construction in Australia is high internationally being some 40% greater than in the US, with Sydney being among the top-five most costly cities in the world.

There are multiple reasons for this high cost of dwelling construction, including the very high cost of labour, along with the unionization of construction workers in the apartment sector,

unwieldy government regulations, and the behavior of local Councils, including the influence of interest groups including environmental lobbies opposing development applications.

8. UNREALISTIC CONSUMER ASPIRATIONS?

In the housing affordability debate it is not often that explicit attention is given to the behaviour – including motivations and preferences – of people and households in choosing where to live and the type of dwelling. There is a long-established literature on what is referred to as the residential location and dwelling decision and choice process dating back to the 1950s (as discussed in Golledge and Stimson, 1997, chapter 13). That includes the behavioural model proposed by Brown and Moore (1970) which was empirically tested in Adelaide by Stimson (1978). That model framework demonstrates how the choice of where to live and the dwelling is a trade-off between what a household decision-unit might aspire to – their ‘aspiration region’ – and what they are able to achieve – their ‘achievement region’ – which is constrained by ‘enabling factors’ such as level of income and access to finance.

It has been well established since Alonso’s (1960) work in the 1950s and 1960s that people in cities exercise choice involving a trade-off between the cost of housing and the cost of commuting, with the residential ‘bid-rent’ curve being highest in central locations with high proximity to jobs and services and declining with increasing distance from those locations to city fringe areas. Households thus make residential location and choice decisions within the context of either paying a premium for housing in the high cost inner suburbs – with their close proximity (and thus convenience) to the CBD – or of locating in the outer suburbs where land and housing is cheap but with households having to incur additional transport costs to gain access to the more job-rich CBD and inner suburbs.

The variation in housing prices across city thus reflects this pattern of the ‘bid-rent function’, with the households with greatest means to purchase or rent being less constrained in choosing where to live as they can afford the higher price of a accessible central locations, while households with fewer means are spatially constrained in choosing where to live - that is, they have to modify their aspirations according to what their means enable them to achieve.

But, of course, in the modern era of the multi-centres metropolis it is not just the inner suburbs but actually the middle and outer suburbs of Australia’s cities where the vast majority of jobs are located, so everyone is not forced to work in the CBD and the surrounding inner-city suburbs where, admittedly, many of the so-called ‘good jobs’ generated by the information economy are geographically clustered. However, it is evident that over the last 5 to 10 years the greatest increase in new employment is occurring in the CBD and some surrounding areas, especially in Sydney and Melbourne, that is related to this. But not all households will be disadvantaged in not having access to jobs by living in the outer suburbs.

All of this is a significant issue for consideration in any discussion of housing affordability.

There may be considerable truth in the concern over the plight of first home buyers in entering the owner-occupied market and for the plight of renters experiencing rent financial stress, at least in parts of Sydney and Melbourne. But perhaps it is not a universal truth, for much of the discussion appears to focus on the plight of younger households, some of whom who might be entering the family formation stage of the life cycle – who work in the inner-city areas and love the ‘cafe-latte’ life-style there – and aspire to purchase a property in those high housing cost locations.

It may well be the case that housing in those locations is simply going to be unaffordable for people and households who might aspire to live in such locations but whose means are such

that they are constrained and thus are unable to afford the high prices to be able to achieve doing so. This has always been the trade-off that people and households have had to exercise in city housing markets, and it is nothing new for the debate on housing affordability. It is, however, also the case that in the outer suburban locations of the big cities ample affordable housing is available and can be accessed if people and households adjust their aspiration to what their means enable them to achieve. Perhaps this is what the ‘young trendies’ seeking to find housing to purchase (or rent) in the high price inner-city areas might need to do to enter the home purchase market. Over their progression through the life-family cycle and over their career path they might be able to exercise a less constrained trade-off between aspirations and achievement and move to more desirable and higher cost housing locations. Thus, the issue of lifestyle preferences of the inner-city trendy classes certainly come into play, and that can cloud a rational debate on housing affordability. Such households could achieve access to quite affordable housing by moving out to the suburbs where the big majority of Australians actually do live, both by choice and by financial necessity, and the latter are in general satisfied with their quality of urban life.

Such cost trade-offs are typical of so many decisions that need to be made in life.

9. WHAT MIGHT BE DONE ABOUT HOUSING AFFORDABILITY?

Housing affordability in Australia is certainly a ‘hot topic’. It is a complex issue relating to a multitude of factors. And it is *not* an issue universally impacting all people and places.

The CoreLogic (2017, p. 56) report on people’s perceptions reinforces that the long-held dream of home ownership continues to exist across generations, but that “... for growing sections within our society, owning a home is becoming an insurmountable challenge”. It warns that “... without action, owning a place of your own – regardless of whether it’s a house or a unit – will be out of reach for Australians who are younger, working part time, earning average wages, or living in key states”. There is now a perception that home ownership is “... becoming the premise of the rich, the older and the lucky” (idem, p. 56).

The CoreLogic (2017) report reminds us how the centralization of population in and around the major cities has in turn reduced affordability around city centres, especially in Sydney and Melbourne, with the lack of adequate transport linkages to outer lying areas detracting from their desirability despite their more affordable housing profile. And a lack of job opportunities in regional cities and towns, where housing is usually affordable, has in turn limited their growth.

So, what might be done to address housing affordability in Australia?

Academic research, official inquiries, and industry reports have canvassed many potential solutions (see, *inter alia*: Industry Super Australia (2017); Gurrans, Gilbert, Gibb, van den Nouwelant, James, and Phibbs (2018); Randolph, Troy, Milligan and van den Nouwelant (2018); UDIA (2018); and the May 29, 2018 AHURI National Conference in Canberra on *Ready for Growth: Affordable Supply Solutions*).

Some of the suggested approaches are outlined in what follows.

9.1. Suggestions from Official Inquiries and Research

Just prior to the large upsurge in housing prices in the current cycle, Taylor (2009) provided an overview of the issues official inquiries and research had identified over the years as impacting housing affordability that need to be addressed through policy initiatives. A major focus was on the influence of land use planning on housing affordability. For example:

- the Graham Report as part of the Special Premier’s Conference (1989) called attention to the “.... substantial effects on housing costs of local and State government building regulations and planning controls” (Wiggins, 1992);
- the Housing Costs Study (1992) “... viewed zoning regulations as severe impediments to the working of market forces in the production of housing” (Abelson, 1993);
- the National Housing Strategy (1991) included an issues paper on “The efficient supply of affordable land and housing: the urban challenge”, with sections on the impact of planning;
- the Productivity Commission First Home Ownership Inquiry Report (2004) included sections on planning impacts on new housing supply; and
- the Senate Select Committee (2008) critiqued urban growth boundaries and planning processes.

Since the late 1980s, each successive residential property cycle has seen national policy concerned with housing affordability tending to look to how national codes and programs seeking to reform land use planning might be used, and that included:

- the Local Approvals Review Program (LARP) (1992);
- the Australian Model Code for Residential Development (AMCORD) (1990-1996);
- the Development Assessment Forum (1998); and
- the Housing Affordability Fund (Commonwealth of Australia, 2008).

The link between housing affordability and planning issues had also been identified in 38 papers in academic journals in Australia published between 1989 and 2008 reviewed by Taylor (2009). And that continues to be the case in subsequent research findings on solutions to address housing affordability.

9.2. Some Recent Industry Perspectives

Moving on to the current housing price cycle, recently industry interests have proposed many fronts on which action might be taken to address what is seen as deteriorating housing affordability. Some of those are listed in Table 10.

A report by Industry Super Australia (2017) proposes a series of general policy suggestions to address housing affordability as listed in in Table 11. And the UDIA (2018) proposes the range of policy responses for governments to improve housing affordability that are listed in Table 12. There are many commonalities among these perspective from industry.

9.3 Current Policy Responses

Recently the Commonwealth Government has in fact implemented actions that are consistent with some of the proposals that have been put forward by industry. That includes:

- stricter rules on foreign investors administered by the FIRB that include a 50% cap on investors buying into single development, and a vacancy charge on empty investment properties;
- the First Home Super Saver Scheme that allows access to voluntary superannuation contributions for first home buyers; and
- a tightening of negative gearing claims for travel costs by investors.

And there has been a crackdown by regulators that include a 30% cap on investor loans and a higher cash rate for investor loans aimed at assisting first home buyers to compete with investors.

Table 10: Some Industry Suggestions for Actions to Address Housing Affordability

Real estate Institute of Australia (2011)	The Urban Developer (2017)	The Australian Financial Review (2018)
<ol style="list-style-type: none"> 1. Retaining current arrangements for negative gearing of property investments' 2. Ensuring family homes are not subjected to Capital Gains Tax. 3. Not increasing in Capital Gains Tax on property investment. 4. Removing stamp duties on property transactions. 5. Reviewing the First Home Owner's Grant (FHOG). 6. Establishing a scheme to encourage young Australians to contribute to voluntary superannuation by allowing them to access these resources for the purposes of raising a deposit for a first mortgage. 7. Monitoring of the Housing Affordability Fund and National Rental Affordability Scheme to observe their effects on housing supply and conduct a review which considers additional measures to bridge the demand-supply imbalance. 	<ol style="list-style-type: none"> 1. Finding land and development sites, including: <ul style="list-style-type: none"> • prioritising TODS • getting more out of underutilised site • putting vacant urban parcels to work • making public land available • transforming industrial sites • investing in greenfield development • adding accessory dwelling units. 2. Removing barriers through: <ul style="list-style-type: none"> • better alignment and integration of government agencies for better delivery • engaging stakeholders, speeding-up development processes • scaling-up and creating incentives for efficiencies and innovation • overcoming NIMBYism. 3. Evolve the construction industry to improve productivity through: <ul style="list-style-type: none"> • best practice • transitioning to a production system approach. 	<ol style="list-style-type: none"> 1. Permit draw-down of superannuation for first home buyers. 2. Remove minimum limits on house and apartment sizes. 3. Direct government grant to young first home buyers. 4. Stamp duty exemptions for first home buyers. 5. Review planning laws that do not reflect changing market demands. 6. Incentives to sub-divide existing suburban blocks. 7. Penalties for people who leave existing dwellings empty. 8. Limit Airbnb competition for rental apartments. 9. Value capture from infrastructure projects fed back into mandated affordable housing. 10. Limit/eliminate negative gearing. 11. Tax foreign property investors. <p style="text-align: center;">Douglas Driscoll, CEO of real estate group Starr Partners (reported in Property Observer, Spring 2018)</p> <ol style="list-style-type: none"> 1. Discounted rates for first home buyers. 2. Limiting negative gearing. 3. Abolishing stamp duties on first home buyers. 4. Allowing first home buyers to purchase using their superannuation, 5. Significant investment in regional towns. 6. Shared ownership.

Table 11: Policy Suggestions to Address Broader Housing Affordability Issues

Federal, state and local governments need to coordinate their activity without duplication or political interference. The core elements of any strategy will require:

1. A central body to provide rigorous housing supply forecasting, which will assist with planning.
2. Developing appropriate incentives (for example, tax policy) to encourage institutional investment in a new assisted housing asset class.
3. Expanding the capacity and professionalism of the community housing sector to deal with larger scale developments and tenant administration.

Broad policy suggestions:

1. Explicitly linking state and local government planning and housing approvals to estimates of regional housing supply gaps.
2. Encouraging more work and student visa holders to reside outside of property market hot-spots.
3. Directing all foreign investment in residential property to new buildings.
4. Streamlining town planning procedures by mandating the removal of unreasonable height restrictions within urban infill development zones (including 'inner' and 'middle-ring' suburbs).
5. Discouraging land hoarding by identifying underutilised assets for redevelopment (including assisted housing), and providing recycling bonuses to incentivise the release of public and private sites.
6. Reorienting some current tax concessions for existing property towards investment in new housing and institutional investment in new assisted housing.
7. Reforming land taxes in Australia via the abolition of stamp duties and replacing them with a mix of land and betterment taxes.
8. Promoting stability around property – the largest asset class held by ordinary Australians.

Source: Industry Super Australia (2017, p. 1).

Table 12: Policy Responses Needed from Government Proposed by the UDIA

Commonwealth Government

1. Focus on policies that boost housing supply; provide a certain regulatory environment.
2. Tie the National Cities Performance framework to how and where Future City Deals are struck by highlighting locations where liveability, productivity and prosperity can be enhanced through aligning planning, investment and governance between the three tiers of government, the community and the private sector.
3. Restart the National Housing Supply Council to benchmark costs and provide leadership in planning a national housing supply strategy to address the housing affordability crisis.
4. Support foreign investment that assists unlocking supply of new housing.
5. Increase funding to the National Housing Infrastructure facility to further catalyze housing supply.
6. Use the Commonwealth balance sheet to deliver infrastructure investment for public and social infrastructure using sound infrastructure prioritization methodologies.
7. Maintain existing arrangements for negative gearing and capital gains tax; carefully examine the effect of capital adequacy requirements on the supply of affordable housing and move to remedy any unintended consequences.
8. Remedy the unintended consequences from restrictions on foreign purchasers of agricultural land by clarifying the Agricultural Land definition used by the FIRB to exempt land that is clearly designated for residential purposes.

State and Local Governments

1. Undertake major planning reform to increase the supply of urban land and reduce delays and uncertainty associated with zoning, planning and approvals processes.
2. Move away from stamp duty on property and replace it with a more efficient broad-based form of taxation, which more reasonably shares the burden of new infrastructure.
3. Carefully consider the application of value capture mechanisms to fund new infrastructure and ensure that they are not just another tax on new housing and that the beneficiaries of the 'Value Gain' contribute to the value capture.
4. Remove foreign buyer and developer taxes and surcharges.
5. Reduce up front charges and levies on new housing by favouring the recovery of costs through broad-based recurrent taxes over longer time frames.
6. State and Local governments need to ensure planning agreements for rezonings do not become betterment taxes.
7. Remove foreign buyer and developer taxes and surcharges.

Source: From UDIA (2018, p. 19).

Furthermore, having recently reduced the annual immigration quota from levels around 200,000 to 164,000, the Commonwealth government is now considering measures to direct migrants to settle for five years in places outside of Sydney, Melbourne and South-East Queensland to achieve a more balanced distribution of population and reduce pressure on those metropolitan areas and ease congestion.

Over time, the most consistently implemented policies by both the Commonwealth and the State and Territory governments have been variety of first home buyer subsidy/assistance schemes involving cash grants and stamp duty exemptions or concessions. But, as discussed earlier in this paper, those schemes have tended to be introduced during the upswing, and their real effects on enhancing housing affordability are most questionable.

9.4 Addressing Affordable Rental Housing and Social Housing

The issue of affordable rental housing provision – including social housing – has repeatedly been identified as a priority area where explicit public policy attention is needed.

It is important that policy actions taken by governments are not deleterious to ensure a continuing adequate level of provision of private rental housing and to ensure the potential adverse impacts of taking measures – such as abolishing negative gearing that is being proposed by the Federal Labor Opposition – are averted. Such a move could result in the withdrawal of investment in rental housing, which is led predominantly by ordinary Australian households seeking to diversify their assets and not just the well-off. Back in the time of the Hawke Labor government in the late 1980s such a public policy negative gearing was abolished with an outcome that led to an immediate rapid reduction of investment in rental housing with rents soaring, especially in Sydney, resulting in a reappraisal by the then government and a reversal of the policy.

For rental private housing provided by investors to offer an affordable housing solution it is necessary for supply to be offered at below 75% to 80% of the market price. To achieve that there is a need to pursue innovative approaches.

On the social housing front – where there has been a large unmet demand for a very long time – little policy action has occurred, it being restricted to what have been one-off initiatives such as the Rudd Labor government's National Rental Affordability Scheme (NRAS). It seems governments in Australia are no longer seriously committed to the provision of public housing, nor to fund at an adequate level the provision of social housing through other means such as the community housing sector which remains quite restricted in Australia. Social housing - especially public housing - has long ceased to be a safety valve for new supply of affordable rental housing for disadvantaged households, with it now accounting for just 4.2% of housing nationally, which is among the lowest in OECD countries, with waiting lists ever increasing.

9.5 Getting Serious about Policy to Address Housing Affordability

It seems to be particularly important for there to be a more comprehensive policy approach to achieve systemic reform in order to enhance housing affordability in Australia. The following actions are suggested as being needed:

1. On the *demand front*, the Commonwealth government might impose - at least for a time – a *reduced level of immigration* to ease pressure on housing demand, especially in Sydney and Melbourne, and assist State governments to catch up on the backlog of deficiencies in urban infrastructure and services.
2. On the *supply front*, it is essential to ensure the efficient provision of a sufficient volume of appropriately located, accessible and affordable land and housing, transparent and timely way (as urged by UDIA, 2018, p. 18). That is the province of the State and

Territory governments, along with local Councils, and will need to be achieved through wholesale *reform of planning and zoning and development approvals processes* and the *land banking of future urban land*, all of which are long overdue.

With the increasing emphasis in urban planning on urban consolidation and multi-unit housing supply, there will need to be a continued expansion in supply of medium density housing, and especially to provide that in what is referred to as the ‘missing middle’ suburbs of the major cities, which needs to include the facilitation of ‘*inclusionary zoning*’, and building housing near employment and prioritising *transit-oriented developments (TODS)*.

All levels of government need to identify under-utilized public and private land holdings and excess land holdings by NGOs, and to encourage asset recycling, releasing non-used public land, and transforming industrial sites.

Re-establishing a Housing Supply Council by the Commonwealth government would also be a good move. And it would be useful to identify by LGA – or even suburb – where the need for affordable housing is greatest and which needs to be a task for the Office of National Housing within the Productivity Commission.

3. *Reform of the tax system* is needed, led by the Commonwealth government and supported by the States and Territories, to alleviate - or better still to eliminate - the very substantial impost of stamp duties on residential property transactions and of developer charges/levies on the cost of serviced land and on the price of new housing. That could be achieved through a *broad-based land tax* levied annually on property to fund urban infrastructure with the *elimination of stamp duty and developer charges* as advocated by Infrastructure Australia (2018). Such taxation reform is seen as a potential productivity-enhancing measure, with the Grattan Institute (Cox, 2016) estimating it would amount to a modest annual levy of around \$1,500 to \$2,000 on a median priced house in Sydney and Melbourne.
4. A focus on ‘*building to rent*’ and other initiatives to encourage *private investment incorporating affordable housing provision* is needed to increase the supply of affordable social housing to be accessed by households experiencing housing related financial stress - those who in the past would have gained access to public housing - and including initiatives to be delivered through *public-private partnerships*. That could include incentivizing overseas pension funds and domestic superannuation funds to invest in low cost housing provision and deliver equity investment to affordable housing providers. Affordable tax credits might be an important link to doing that.

There is certainly opportunity for innovation, as well as institutional reforms, in framing approaches to enhancing housing affordability in Australia. An example is that proposed by Gibbs (2017) who puts forward a “whole-of-ownership-life costs” approach which:

.... means we move away from defining affordable housing in terms of the initial capital cost and instead consider the total cost of owning a house over the term of ownership.

... This approach explicitly encapsulates the risks of under-insurance and higher interest rates.

.... This is the approach used when funding infrastructure and major utilities assets.

10. CONCLUSION

Almost two decades ago leading housing economist Judith Yates (2002) reached the conclusion that housing in Australia was becoming less affordable – especially for young people – with home ownership rates falling, suggesting the lack of affordability was not temporary but would

likely extend across some people's lifetimes – especially in some locations – unless policy intervened in some way.

That has all been evident in the recent up-side of the current residential property cycle, with a substantial increase in housing prices that reached an historic peak in mid-2017. But it is evident the housing prices boom is now over, with the declines in housing prices in the downward phase of the current cycle being modest to date, and it is patchy geographically across Australia.

In the June quarter 2018, the price to income ratio for purchasing a dwelling was slightly down to 6.1. For a house it is 7.1 and for a unit was 6.2. And compared to a decade earlier, in June 2008 the repayment on a 80% LVR mortgage required 46.3% of household gross income which was lower than the 51% required in 2008. Variable interest rates back in June 2008 were 8.85% while they were 5.4% in June 2018. In 2008 a house mortgage repayment required 52.4% of household gross income and a unit mortgage required 48.7% of household gross income.

However, it is still cheaper to rent than to purchase, with rents accounting for a little less than 30% of household gross income in 2018, but it was down to 26.9 in June 2018. This is due to the low level of rent appreciation of only 2.9% per annum over the decade.

Nonetheless, housing prices in Australia remain at levels of around one-third higher than they were five years ago. Uren 2018b: p, 23) reminds us that owner occupiers are still “sitting on large unrealised gains” while many investors could be “confronting the discomfort of negative equity if the price slide picks up”. And the Urban Developer (2018) suggests while housing affordability has been improving in recent months as market conditions have softened, the “long-term has seen affordability across the nation deteriorate”.

So, the debate on housing affordability continues to rage.

What may be learned from the review of housing affordability in Australia in this paper?

1. There are *multiple housing markets in Australia* with profoundly different levels of housing prices, and housing affordability is a complex and multi-faceted issue, impacted by diverse demand and supply drivers along with institutional factors, and which has been measured in a wide variety of ways.
2. The debate on housing affordability is not a new phenomenon but one that reemerges during the up-side boom phase of all the residential property cycles in Australia since the 1970s. It is an issue that has been accumulating over several decades, and solutions will need co-ordinated long-term commitment and systemic reform on numerous fronts, and across all three levels of government, But, based on the lack of that in the past, it appears unlikely to occur given current policy settings or the lack of them, despite the many proposals or actions suggested over the years from research, official inquiries, and industry organisations. While governments alone cannot provide the full solution, they can and should take significant and initiatives.
3. As usual, housing prices continue to vary geographically across Australia, with Sydney having the worst affordability, followed by Melbourne. Not only are there marked difference between the capital cities and the regions, but also within the cities in the quantum of measures of housing affordability, there are also differences in the magnitudes and trends in house price fluctuations in the up- and the down-sides of residential property cycles in Australia.
4. *Housing prices at a specific location might be affordable for some households but not for other households.* Households have always had to adjust their housing aspirations and where they might aspire to live as either purchasers or renters to what they can achieve within the constraints of their economic circumstances at a given point in time, but the

limits of those constraints are exacerbated during the up-side of the residential property cycle. Thus, housing affordability is both *person or household* and *place* dependent.

5. When measured by the '30:40 rule' relating to the incidence of housing-related financial stress, the aggregate level across Australia there has not been much change over time in the incidence of housing financial stress. Housing affordability and the incidence of housing related financial stress is predominantly – but not exclusively – a Sydney and Melbourne phenomenon, and especially in the inner suburbs of those cities.
6. ABS (2017) data shows that, across Australia, over the five years 2011-2016, home owners with a mortgage had experienced has a decline in the proportion of household gross income being spent on mortgage costs which was 16%, while for renters the proportion being spent on rent remained stable at around 21%, and for public housing authority tenants the figure was unchanged at 21%:
 - Three-quarters of households spent 25% or less of gross household income on housing costs, a decrease from 80% in 1995-96;
 - 7% spent between 25% and 30% of their gross household income on housing costs, an increase from 6% in 1995-96;
 - 12% spent between 30% and 50% of their gross household income on housing costs, an increase from 10% in 1995-96; and
 - 6% households spent more than 50% of their gross household income on housing costs, an increase from 4% in 1995-96.

There were, of course, considerable geographic differences in these figures reflecting the *spatial variability underpinning housing affordability*.

7. In the housing affordability debate - and especially in framing policy to assist those households impacted by deteriorating housing affordability - *it is important to target and identify those households that are experiencing housing financial stress as measured by the '30:40 rule', rather than using other less targeted measures of housing affordability*.
8. *The high level of immigration has been and will remain a key driver of demand for housing*, particularly in Sydney and Melbourne, and is a key policy lever over which the Commonwealth government has control.
9. *Constraints on housing supply is an issue*, with the gap between underlying demand and the supply of housing continuing to be substantial, estimated by AHURI (2017) to have been as high as 527,500 units in 2017, while more conservative estimates of the gap are lower at around 300,000. But that gap is still substantial and addressing the housing supply deficit issue needs to be a priority concern for policy.
10. There are concerns, particularly in the Sydney and Melbourne markets - and perhaps also in Brisbane - that *the apartments markets will suffer a substantial down-turn* as will house prices in general at the upper end of with a market, *with many home purchasers and investors likely to experience of negative equity in their properties*, to be exacerbated by likely impending increase in interest rates widely mooted to occur over the next year or so, along with the high level of household debt running at nearly 200% of household income which will see a rise in the incidence of mortgage repayment defaults. Survey data suggests *as many as 996,000 households are currently suffering a mild degree or more of financial stress in meeting their housing costs* (Sui-Lin Tan, 2018), and that would increase a lot.

11. *Comprehensively addressing housing affordability will require concerted co-ordinated action* – rather than through the current knee-jerk and one- interventions and a ‘one-size-fits-all’ approaches – that would need to embrace:
- reform of the taxation system including introducing a *broad-based land tax* to fund urban infrastructure to eliminate stamp duty and developer charges to reduce the price of housing;
 - *innovation in the funding and provision of affordable social housing* – ‘build to rent housing – through public-private partnerships facilitated through appropriate tax concessions and institutional investment to rejuvenate Australia’s lagging social housing provision; and
 - *reform of metropolitan planning systems and zoning and development approval practices to reduce holding costs*, facilitate the provision of new housing widely across cities, and better integrate the provision of diversified forms of housing, services, and infrastructure, and improve access to employment.

Housing affordability will doubtless continue to be a hot topic in Australia, and discussing the issue is fair enough; but there needs to be care as to what the issue really is, who it affects, what are the causes and what might be appropriate policy responses to address the issue if it is a real problem and not a beat-up issue. There would be greater clarification as the who and how many are being affected if we were to focus attention on the ‘30:40 rule’ to identify those suffering from housing mortgage or cost-related or rental-related housing financial stress, and to focus especially on measures to ramp-up affordable rental housing supply.

However, we need to keep reminding ourselves that housing affordability – or the lack of it – is something that is both *people* and *place* specific, which renders it somewhat unhelpful to draw blanket conclusions on what to do about it.

In conclusion, it is thus a ‘long bow’ to claim there is a housing affordability ‘crisis’ across Australia, while it is a problem in some markets, for some lower income household, for some aspiring first home buyers even to enter the market, and for some renters. But it is *not* pervasive. There is a challenge much for new policy initiatives to address housing affordable in Australia.

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Factors Associated with Nutritional Status of Children in Low and Middle Income Countries in Southeast Asia – A Multilevel Analysis

Rossita M. Yunus and Azizur Rahman

University of Malaya, Malaysia

Charles Sturt University, Australia

rossita@um.edu.my and azrahman@csu.edu.au

ABSTRACT

The malnutrition of children in middle and low income countries has continued to be an important health and social issue. Malnutrition is responsible for about 45% of all deaths among under-5 children and affects the physical growth and logical development of children. The specific objectives of this study are: (i) to examine the association between significant risk factors and malnutrition of children aged under-5 years in low and middle income countries from the Demographic and Health Surveys (DHS) dataset; (ii) to identify the presence of heterogeneity between studies; and (iii) to determine for any significant difference in factors associated with the chronic malnutrition status – stunted and non-stunted children. Samples were taken from the Demographic and Health Survey for the period from 2008 to 2017 in low and middle income countries across the Southeast Asia region. The multilevel linear regression method is used to identify factors that contribute to the malnutrition of children, and to determine variability in the studied countries. The multilevel study is expected to give a better picture to understand the true association between childhood malnutrition and its associated factors compared to a single level of analysis. Important risk factors associated to malnutrition of children in Southeast Asian low and middle income countries are expected to be identified.

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1. INTRODUCTION

Child malnutrition still remains one of the most serious health problems in low and middle income countries (Rahman and Biswas, 2009) and it is responsible for 45% of all deaths among under-5 children (Black *et al*, 2013). It is reported that the prevalence of various forms of malnutrition such as stunting (height-for-age), wasting (weight-for-height), and underweight (weight-for-age) in pre-school children were 159 million (24.7%), 50 million (7.8%), and 95 million (15.1%), respectively in 2014 worldwide (WHO, 2014). Malnutrition affects the

children's physical growth, cognitive development, mortality, morbidity, physical and mental work capacity (Rahman *et al*, 2009). It prevents them from reaching their full physical and mental potentiality and growth, also causes lower intellectual and physical abilities in adult life (Black *et al*, 2013). The mother's BMI, household wealth, parental education, media exposure, number of preschool siblings, size at birth, duration of breast feeding, mothers' height and measles vaccination are the factors associated with childhood malnutrition (Rahman and Chowdhury, 2007; Rahman *et al*, 2008).

In South-Asian countries, economic improvements have not been adequately reflected in improvements in child nutrition (Fakir and Khan, 2015). The absolute number of stunted children is much higher in this region than anywhere else in the world, and over 50% of South-Asian children are underweight, comparing to 30% in Africa (Ramalingaswami *et al*, 1997). In South-Asia, poverty, hunger, malnutrition, disease and social inequality are interlinked factors. For an example, about 31.5% of the population lives below the national poverty line in Bangladesh and for every 1000 babies born, 31 die before their first birthday (Pelletier *et al*, 1995). Two-thirds of childhood deaths occur as a consequence of malnutrition in Bangladesh (Ramalingaswami *et al*, 1997). The rate of malnutrition in Bangladesh is almost double that of African countries Somalia or Mozambique and somewhat is equal to that of Ethiopia (Megabiaw and Rahman, 2013).

Although the rate of child malnutrition have been decreasing in recent years due to initiatives from local and international organizations, present rates of child malnutrition are still alarming. According to WHO, the level of stunting and underweight levels are both above the threshold 'very high' prevalence (WHO, 1995). These malnourished children are at greater risk of dying, deficit disorder, memory deficiency, cognitive development, physical and mental work capacity, learning disabilities, impaired school performance, and the like (Nnyepi *et al*, 2006). Moreover, childhood nutritional status can vary from community to community. Region is a significant determinant of child malnutrition (Rahman and Chowdhury, 2007). It is found from a study of 47 developing countries that there are significant differences in child nutrition outcomes in rural and urban areas (Van de Poel *et al*, 2007). Although, there are some recent studies about the determinants of malnutrition, researchers have not directed their attention toward a comparison of under-5 child malnutrition between low and middle income countries in Southeast Asia. This study aims to examine the association between risk factors and childhood malnutrition in low and middle income countries in Southeast Asia using the Demographic and Health Surveys dataset, and then identify the presence of any heterogeneity and determine any significant difference in the risk factors across the region. The findings of the study will help policy makers achieve the goal of a two-third reduction in childhood mortality by reducing the overall burden of malnutrition.

The outline of this paper is as follows. The next section provides information about the research materials and methods. Then overall analyses are presented and described in the results section. A discussion about the significant findings is provided in the discussion section. The conclusion section highlights some final remarks with policy implications.

2. MATERIALS AND METHODS

Data from the Demographic and Health Survey for the period from 2008 to 2017 in low and middle income countries across the Southeast Asia region were taken for the analysis. Due to unavailable information data, five different sets of data from the surveys that were conducted in different period of time and countries are considered in the analysis. Altogether, there are 28,455 survey respondents, after removing the respondents with missing values. The malnourished children was identified by height-for-age (stunted) measure used widely for

measuring malnutrition. The indicator was categorized into two groups, “Nourished” and “Malnourished”. To be more specific, on the basis of Z-score of height-for-age (HAZ), a child was classified as malnourished if his/her Z-score for each indicator (HAZ) was respectively exposed in the ranges: Z-score < -2.0 and Z-score ≥ -2.0 . The HAZ was calculated by using the WHO AnthroPlus Software (version 3.2.2, 2011) from the age, height and gender of the children (WHO, 2011).

Four demographic and socioeconomic factors of child malnutrition are selected as covariates for comparing results between countries. These factors are the types of place of residence where the respondent was interviewed as either rural or urban, the mother’s education level as either unschooled or at least attend primary school, the respondent’s household size that consists of as either has at most 5 or more than 5 household members, and the respondent’s working status whether the respondent is currently working or not working. Note that all of these variables are dichotomous, that is they are categorical variables, each with two categories or levels.

The multilevel model (Das et al, 2018) that is used to assess the relationship between malnourished and the dichotomous variable is given by the following equations:

$$y_i = \mu_i + \varepsilon_i \text{ at level 1 (within studies)}$$

$$\mu_i = \mu + \eta_i \text{ at level 2 (between studies)}$$

where y_i is log relative risk for categorical variable for study i , $\varepsilon_i \sim N(0, v_i)$ is within sampling error with within study variance v_i , $\eta_i \sim N(0, \tau^2)$ represents the between study heterogeneity, and μ is the average effect of interest.

The relative risk is simply defined as the probability of stunted child in the category I divided by the probability of stunted child in the category II.

3. RESULTS

Table 1 gives percentages of stunted children in the two categories of the dichotomous variables, relative risk and 95% confidence interval for all studies (survey datasets). For all five survey datasets, we observed that the percentage of stunted children in rural areas is higher than in urban areas, the number of stunted children whose respondents receive no education is more than for those who are at least attend primary school, the percentage of stunted children whose respondent’s household size is at most 5 persons, is slightly less than that with size more than 5 persons, and the number of stunted children whose respondent always working is less than that of the jobless respondents. For this single level of analysis, individual relative risk was calculated for each study. The probability of stunted children in rural areas is 1.32 times larger than that in the urban areas for Cambodia 2008 (RR 1.32, 95% CI 1.21 to 1.44).

The evidence for an association between malnourished and risk factors is given in Table 2. The pooled relative risk of combined studies is obtained from the multilevel model. Stunting is significantly 18% higher for children in rural areas than in urban areas (RR 1.18, 95% CI 1.07 to 1.3, $P < 0.01$). There is a significant increase of 21% in the relative risk of stunted children whose respondent has no education, compared with that of respondents that at least attend primary school (RR 1.21, 95% CI 1.10 to 1.32, $P < 0.01$). The probability of stunted children whose respondent’s household size is at most five and that of size more than five is not significant at the 5 % significance level (RR 0.93, 95% CI 0.86 to 1.01, $P = 0.10$). The probability of stunted children whose respondent unemployed is significantly 7.5 percent higher than that of working respondent (RR 0.93, 95% CI 0.86 to 1.00, $P = 0.05$). No heterogeneity in relative risk between studies was observed for all variables.

Table 1: Percentage, Relative Risk and 95% Confidence Interval for Individual Studies

Types of Place of Residence	Study	Percentage of Stunted Children		Relative Risk [95% confidence interval]
		Rural	Urban	
	Cambodia 2010	47.96	36.28	1.32[1.21, 1.44]
	Cambodia 2014	40.15	34.27	1.17[1.07, 1.28]
	Myanmar 2015-16	34.56	26.21	1.32[1.17, 1.49]
	Timor-Leste 2009-10	67.13	65.31	1.03[0.99, 1.07]
	Timor-Leste 2016	59.38	52.45	1.13[1.08, 1.19]

Mother's Education	Study	Percentage of Stunted Children		Relative Risk [95% confidence interval]
		No education	At least primary school	
	Cambodia 2010	54.78	42.16	1.3[1.21,1.4]
	Cambodia 2014	45.17	37.43	1.21[1.1,1.33]
	Myanmar 2015-16	42.72	30.82	1.39[1.26,1.53]
	Timor-Leste 2009-10	69.94	65.04	1.08[1.05,1.11]
	Timor-Leste 2016	62.73	55.51	1.13[1.08,1.18]

Types of Household Size	Study	Percentage of Stunted Children		Relative Risk [95% confidence interval]
		At least 5	More than 5	
	Cambodia 2010	44.44	45.4	0.98[0.91,1.05]
	Cambodia 2014	37.85	39.31	0.96[0.89,1.03]
	Myanmar 2015-16	28.7	36.86	0.78[0.71,0.85]
	Timor-Leste 2009-10	64.61	67.35	0.96[0.93,0.99]
	Timor-Leste 2016	56.83	57.54	0.99[0.95,1.04]

Respondent Working Status	Study	Percentage of Stunted Children		Relative Risk [95% confidence interval]
		Not working	Working	
	Cambodia 2010	40.1	47.18	0.85[0.79,0.92]
	Cambodia 2014	36.46	39.6	0.92[0.85,1]
	Myanmar 2015-16	29.96	35.44	0.85[0.78,0.93]
	Timor-Leste 2009-10	66.67	66.77	1[0.97,1.03]
	Timor-Leste 2016	57.46	57.08	1.01[0.97,1.05]

4. DISCUSSION

We found that the types of place of residence, the respondent level of education and the respondent working status are associated with the probability of stunted children. Child living in urban was nourished compared to child living in rural. We suspect there are unmeasured risk factors in the rural community. A child whose respondent is working tends to be malnourished compared to a child whose respondent is unemployed. Respondents in the survey are usually female, and most probably the mother of the child. But in some countries, the respondents are male. Respondents with no education tends to have child malnourished more than those with education background is at least primary school. Household size does not seem to be a significant risk factor of stunting for the studied datasets.

Table 2: Pooled Relative Risk and 95% Confidence Interval for the Combined Studies

Risk Factors	Pooled Risk Ratio [95% confidence interval]	Effect test Z (P-value)	Variability test Q (P-value)
Type of Place of Residence (Rural/Urban)	1.18 [1.07,1.3]	3.4 (<0.01)	42.25 (<0.01)
Mother's Education Level (No education/ At least primary school)	1.21 [1.1,1.32]	4.07 (<0.01)	42.98 (<0.01)
Total Number of Household (At least 5/More than 5)	0.93 [0.86,1.01]	1.65 (0.10)	23.74 (<0.01)
Respondent is currently working (No/Yes)	0.93 [0.86,1.00]	1.97 (0.05)	28.49 (<0.01)

5. CONCLUSION

The multilevel study has given us a better picture to understand the true association between childhood malnutrition and its associated factors compared to a single level of analysis. The analysis has given us a pooled estimate of relative risk for all the combined studies. Risk factors associated to malnutrition of children in Southeast Asian low- and middle-income countries are identified. The risk factors are the types of place of residence, the mother's level of education, and the respondent's status of working.

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