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Benchmarking the Competitiveness of Australian Global Cities: Sydney and Melbourne in the Global Context

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ABSTRACT *In this article, we construct an integrative model of urban competitiveness, which incorporates economic and non-economic dimensions, and combines determinants and indicators of a city's competitiveness. We apply this model to evaluating the competitiveness of Australian cities (Sydney and Melbourne), benchmarked against a group of counterpart global cities (New York, London, Los Angeles, San Francisco, Toronto, Frankfurt, Hong Kong, Singapore and Shanghai). The results reveal the global status of the Australian cities, and point out their competitive strength in the dimensions of Liveability and Attractiveness, Creativity and Diversity, and Environmental Sustainability, and competitive weakness in the dimensions of Governance, Connectivity and Enterprise Hub. We conclude with a discussion about enhancing the competitiveness of Australian global cities.*

本文建构了一个城市竞争力的综合模型，其中包含经济和非经济维度，把城市竞争力的各种决定因素和指标结合在一起。我们用这一模型评估澳大利亚不同城市（悉尼和墨尔本）的竞争力，并与世界上其他同类城市（纽约、伦敦、洛杉矶、旧金山、多伦多、法兰克福、香港、新加坡、上海）相比较。研究结果显示，澳大利亚城市在全球的排名，在宜居、吸引力、创造力、多样性、环境可持续性等方面的竞争优势，以及在治理、联结性、企业聚集度方面的弱点。文章结尾探讨了如何强化澳大利亚国际都市竞争力的问题。

KEY WORDS: Urban competitiveness, global cities, Sydney, Melbourne

Introduction

In recent years, there has been a (re)emerging interest in the quest for the competitiveness of Australian cities—particularly for the two leading cities of Sydney and Melbourne—in the global context. Governments (federal, state and city) and the business sector have shown the

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greatest enthusiasm, by formulating global strategies and conducting comparative global studies of both Sydney and Melbourne (see OECD, 2003; State of Victoria, 2003; State of New South Wales, 2005; Committee for Sydney, 2007, 2009; City of Melbourne, 2008; City of Sydney, 2008; Sydney Chamber of Commerce, 2008; Commonwealth of Australia, 2010; Sydney Business Chamber, 2010). This enthusiasm is also reflected by the media and by the wider community. Terms like ‘global city’ and ‘competitiveness’ appear frequently in local headlines, at city-marketing events and at public talks.

Similar quests have been undertaken by Australian scholars, starting in the early 1990s. These scholarly works have largely concerned the impacts of globalisation on Australian cities, on Sydney in particular (see Daly & Stimson, 1992; Lepani *et al.*, 1995; Newton, 1995; O’Connor & Stimson, 1995; Searle, 1996, 2008; Baum, 1997; Daly & Pritchard, 2000). Internationally, systematic studies of cities and competitiveness have focused on either American cities or European cities (see Kresl & Singh, 1994, 1999, 2012; Kresl, 1995; Jensen-Butler *et al.*, 1997; Lever, 1999; Greene *et al.*, 2007; Ranci, 2011). Some international comparative studies have been made, but the few Australian global cities were submerged by their more dominant American and European counterparts, and by their rising Asian Pacific competitors (see Beaverstock *et al.*, 1999; Ni & Kresl, 2010; Taylor *et al.*, 2011). There is a need to contribute to the global discourse on urban competitiveness, with a focus on Australian global cities.

In this study, we attempt to evaluate the competitiveness of the Australian global cities, Sydney and Melbourne, benchmarked against a group of counterpart global cities (New York, London, Los Angeles, San Francisco, Toronto, Frankfurt, Hong Kong, Singapore and Shanghai). This study has two key aims: (1) to construct an integrative model to measure the competitiveness of global cities; and (2) to identify the competitive strength and weakness of Sydney and Melbourne relative to the group of leading global cities. Following the introduction, the next section provides an overview of the literature on the conceptualisation of, and the approaches to, urban competitiveness. The third section explains the methods of carrying out this study. The fourth section offers the analytical results. The last section concludes with a discussion on enhancing the competitiveness of Australian global cities.

Urban Competitiveness: Concept and Approach

This study concerns the competitiveness of global cities. The term ‘global city’ is derived from the contemporary discourse of globalisation and cities. It was coined to capture both the dispersion and centralisation processes of economic activities in an integrated global economy, that is, the dispersion of production and retailing activities across the world and the centralisation of specialised services and command within a few global cities (Sassen, 1991). Sassen (2001) explains that the term ‘global city’ is used knowingly to name a difference: the specificity of the global cities is structured in the contemporary period, while the term ‘world city’ refers to a type of cities that have existed for centuries (Hall, 1984; King, 1990). Nowadays, ‘global city’ and ‘world city’ tend to be used synonymously.

As strategic urban nodes of the world economy, global cities are linked to one another and form a hierarchical global city system (Friedmann & Wolff, 1982; Friedmann, 1986, 1995; Sassen, 1991, 1994; Taylor, 1997, 2004, 2008). The UK-based Globalisation and World Cities (GaWC) research programme has been active in ranking cities in a global system. In their first systematic study of 122 cities across the world in 1999, cities were

selected according to their 'global capacity' of providing advanced producer services in terms of accountancy, advertising, banking/finance and law (Beaverstock *et al.*, 1999, p. 446). This criterion is built upon Sassen's (1991) argument that it is the advanced producer services that are the distinctive features of the contemporary global city's formation. Aggregating the selected cities' performances in the advanced producer services produced a roster of world cities (Alpha world cities, Beta world cities and Gamma world cities), which are thought of as having a very solid indication of 'world-cityness' (Beaverstock *et al.*, 1999).

The GaWC programme carried out further studies to rank world cities in 2000, 2004 and 2008, respectively, based on an interlocking network model (GaWC, 2009). The interlocking network model assumes three levels of nets in the world city network—the net level of the global economy, the node level of cities and an additional sub-nodal level of service firms. The underpinning argument is that it is firms which are the network makers not the cities themselves in the global economy (Taylor, 2004). The intra-firm connections of the advanced producer service firms create network relations and form a "city-centred world of flows" (GaWC, 2009). Cities are assessed through the locational strategies of global service firms and are classified into different levels of the world city network integration according to the firm-based connectivity measures. Taylor (2009) contends that city rankings fit into the approach of inter-city relations that emphasise competition between cities. Global cities compete against each other in the global city hierarchy; an individual city's position in the hierarchy is determined by its capacity to compete.

Conceptually, urban competitiveness takes its roots in the competitiveness of industries and firms (Porter, 1985; Krugman, 1993, 1996a). The proposition of territorial competitiveness was first applied to nations (Porter, 1990), and then extended to cities (Kresl & Singh, 1994; Kresl, 1995; Porter, 1995). The notion of territorial competitiveness is challenged by the argument that cities (regions, countries or continents) do not compete with one another: they are the locus for firms and enterprises, which compete (Krugman, 1996a, 1996b). The counterargument is that territorial competitiveness should not be approached in the same way as business competitiveness. Cities and regions do compete, but not in the same way as commercial enterprises do, as the latter compete for profit maximisation. In contrast, cities and regions compete in more complex ways for more complex goals, such as investment, population, talents, funding for public infrastructure and events like the Olympic Games (Porter, 1995, 1996). Although cities do not compete as firms do, some cities provide better environments than others for firms to do business (Boddy & Parkinson, 2004). It follows that a city's competitiveness is related to its mix of attributes for business operations (Begg, 1999).

The aforementioned discourse on urban competitiveness comes from a predominantly economic perspective. Urban or regional competitiveness is essentially about economic competitiveness, and is measured by economic success (Kresl & Singh, 1994, 1999, 2012; Kresl, 1995; Rogerson, 1999; Boddy & Parkinson, 2004; Budd & Hirmis, 2004; Turok, 2004). Accordingly, an explanatory approach is often employed to differentiate the 'outcomes' and 'inputs' of urban competitiveness. The outcomes are the 'indicators' of urban competitiveness (GDP, employment, income, etc.), while the input factors are the 'determinants' of urban competitiveness (productivity, innovation, infrastructure, etc.) (Begg, 1999; Greene *et al.*, 2007; Jiang & Shen, 2010).

Nevertheless, the economy-centric conceptualisation and the linear determinant-indicator approach have been questioned for insufficient representation of the complexities of urban competitiveness (Jensen-Butler *et al.*, 1997; Begg, 1999; Lever, 1999) and for possible misleading of problematic policy implications (Jiang & Shen, 2010). Some studies emphasise the importance of incorporating non-economic dimensions into the conceptualisation of, and the methodological approach to urban competitiveness, including quality of life (Begg, 1999; Rogerson, 1999), liveability (Ling & Yuen, 2010), urban governance (Shen, 2004), urban amenities (Florida, 2002), social cohesion (Ranci, 2011) and Environmental Sustainability (Petrella, 2000; Bulkeley & Betsill, 2005). Some scholars argued for the importance of applying an integrative approach to urban competitiveness, to include economic, social and environmental dimensions (Ng & Hills, 2003; Shen, 2004; Jiang & Shen, 2010). For this purpose, Jiang and Shen (2010) propose a sustainable development perspective that balances economic, social and environmental dimensions, and they argue that economic, social and environmental dimensions are interrelated and contribute to a city's comprehensive competitiveness.

In this study, we attempt to advance the scholarship on urban competitiveness along two strands. On the first strand, we approach urban competitiveness from a singular economic perspective to an integrative one that includes economic and non-economic dimensions. On the second strand, we measure urban competitiveness in a model that incorporates attributes as well as performances of a city's competitiveness. The attributes refer to the 'determinants' of a city's competitiveness; the performances refer to the 'indicators' of a city's competitiveness. We apply this new approach to measuring the competitiveness of the Australian cities of Sydney and Melbourne, benchmarked against a group of leading global cities.

Methods

The implementation of this study involved three major components: (1) design of an integrative model of urban competitiveness and its metrics; (2) selection of the benchmark cities; and (3) data collection and synthesis. A panel of experts assisted with the design of an integrative model of urban competitiveness and the selection of the benchmark cities. The purpose of the panel was to assure the validity of the model and the benchmark cities, and their applicability to Australian global cities. The panel members included Australia-based urban academics, policy leaders and business leaders. They are active participants and insiders of the discourse of Australian global cities. The consultation process took place in various forms, including individual meetings, group discussions, telephone conversations, email exchanges and reviews of research proposals.

Based upon the literature discussed above, we designed a preliminary model with a hexagonal structure that has six dimensions; each dimension includes three indicators, resulting in 18 indicators in total. An overview of similar studies (i.e., MasterCard Worldwide, 2008; Sydney Chamber of Commerce, 2008; GaWC, 2009) particularly informed the selection of the dimensions and indicators contained in the model. The panel of experts were then consulted, which resulted in modifications and adjustments of certain dimensions and indicators. Two criteria guided the construction of the model, including the consultation process. One is the standardisation and measurability of the model: the model's hexagonal structure of six dimensions and 18 indicators should be fixed, despite adjustment or alteration of certain dimensions or indicators. The other is the 'integrativeness' of the model: the model should incorporate economic and non-economic

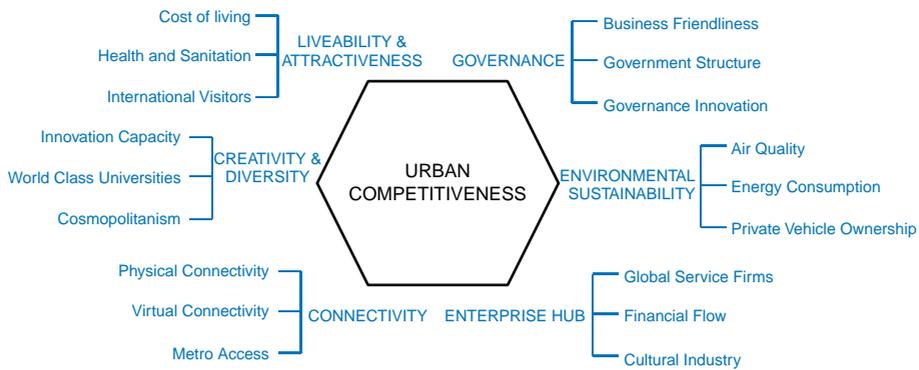


Figure 1. An integrative model of urban competitiveness

dimensions, and combine endogenous attributes (determinants) and exogenous performances (indicators) of a city’s competitiveness. The final model is illustrated in Figure 1.

The criterion for selecting the benchmark cities is their relevance to the Australian global cities of Sydney and Melbourne. We proposed a dozen of the cities for consultation with the panel of experts, which was a pretty open-ended process. As a result, nine cities were selected on the bases that they include (1) leading global cities: London, New York; (2) representative global cities from North America and Europe: Toronto, Frankfurt; and (3) comparable or competitor global cities on the Pacific Rim: San Francisco, Los Angeles, Hong Kong, Singapore and Shanghai. A long list of benchmark cities could have been chosen. However, this group of cities were selected for their relevance to Sydney and Melbourne, in terms of representativeness, comparability, geographical location and regional competition.

We defined the measures for the 18 indicators of the integrative model of urban competitiveness and collected data mostly from institutional databases, including GaWC, MasterCard Worldwide, Mercer, World Bank and Euromonitor International, and the websites of individual cities (refer to Appendix 1 for measures and data sources of the indicators). We used mixed methods of relative weighting and equal weighting to synthesise the data. The collected data were in different forms; they were standardised for each indicator. Of the 11 cities, the city with the highest value (or best performance) was weighted as 10, while the city with the lowest value (or worst performance) was weighted as 1, and the remaining cities were weighted according to their original values between the highest and the lowest. This standardisation method determines that the values for one city’s indicators are relative rather than absolute, that is, their ultimate values are relative to the values of the other cities in the group.

We used the equal weighting method to calculate one city’s dimensional and integrative competitiveness. As an objective weighting method, the equal weighting method assigns the same weight to indicators at the same level in a hierarchical indicator system (Jiang & Shen, 2010). In this study, we assigned the maximum value of 10 and the minimum value of 1 to the indicators of urban competitiveness. Then we calculated a composite index for each dimension of urban competitiveness by aggregating the values of the three subordinate indicators; and a composite index of integrative competitiveness was calculated by aggregating the values of the six dimensions. Theoretically, a ‘perfectly

performing' city could achieve an index value of 30 for each dimension and an index value of 180 for integrative competitiveness in this model.

The mixed methods of relative weighting and equal weighting differentiate this study from other studies that have used absolute indicators, which often depend on a city's size, to measure that city's competitiveness (Jiang & Shen, 2010; Ni & Kresl, 2010; Taylor *et al.*, 2011). These methods help reveal not only a city's competitiveness, but also its competitiveness in relation to other benchmark cities, so as to provide a deep and holistic understanding.

Results

Relationships among the Indicators and Dimensions of Urban Competitiveness

We calculated the Spearman correlation coefficients respectively for the 18 indicators, and the six dimensions of urban competitiveness, to measure the relationships among them. The purpose is to verify if one city's competitive performances in various indicators, and in various dimensions, are interrelated.

Of the 18 indicators, three distinct patterns emerged from their Spearman correlation coefficients. Firstly, three indicators have no correlation with any other indicators at all; they are Government Structure, Air Quality and Energy Consumption. Secondly, two indicators have negative correlations only with other indicators; they are Cost of Living and Private Car Ownership. Thirdly, the remaining 13 indicators have positive correlations with other indicators to different degrees.

The majority of the indicators of urban competitiveness are positively correlated with one or more indicators (statistically significance at the 0.01 level). The indicator Innovation Capacity is positively correlated with seven indicators, enjoying the most positively correlated indicators; they are Air Passenger (Spearman correlation coefficient 0.77), Metro Transport (Spearman correlation coefficient 0.86), Global Service Firms (Spearman correlation coefficient 0.96), Financial Flow (Spearman correlation coefficient 0.85), Cultural Industry (Spearman correlation coefficient 0.77), World Class Universities (Spearman correlation coefficient 0.78) and International Visitors (Spearman correlation coefficient 0.85). The indicator Global Service Firms is positively correlated with the second most indicators, six; they are Air Passenger (Spearman correlation coefficient 0.84), Metro Transport (Spearman correlation coefficient 0.86), Financial Flow (Spearman correlation coefficient 0.79), Cultural Industry (Spearman correlation coefficient 0.81), Innovation Capacity (Spearman correlation coefficient 0.96) and World Class Universities (Spearman correlation coefficient 0.87). These positively correlated indicators reveal that within the integrative model of urban competitiveness, a city's economic indicators are interrelated with its non-economic indicators; a city's endogenous attributes are interrelated with its exogenous performances.

The exceptional indicator is Cost of Living, which is negatively correlated with Global Service Firms (Spearman correlation coefficient -0.76), World Class Universities (Spearman correlation coefficient -0.77) and International Visitors (Spearman correlation coefficient -0.82). It is justifiable that global cities with high capacities in terms of business services, education and international travels, tend to have higher cost of living.

Nevertheless, the hypothetical interrelations among the dimensions of urban competitiveness are not fully supported by the correlation analysis. Of the six dimensions,

only three dimensions indicate positive correlations (statistically significant at the 0.01 level): Enterprise Hub is positively correlated with Connectivity (Spearman correlation coefficient 0.838) and Creativity and Diversity (Spearman correlation coefficient 0.871), and Creativity and Diversity is positively correlated with Connectivity (Spearman correlation coefficient 0.920). Some intrinsic interrelationships among these three dimensions of competitiveness can be deduced: the dimension of Connectivity, which measures a city’s transport (international and intra-city systems) and broadband services, provides the required infrastructure to support a city’s capacity of business services, financial services and cultural services, which are measured by the dimension of Enterprise Hub; the dimension of Creativity and Diversity, on the other hand, measures a city’s innovation capacity, human capital and social environment, which are important determinants of a city’s role as an Enterprise Hub.

Integrative Competitiveness and Dimensional Competitiveness

Integrative competitiveness. A composite index of integrative competitiveness is calculated by aggregating the values of indicators, and then of dimensions of a city’s competitiveness (refer to Appendix 2 for specific values of indicators and dimensions). The global cities are ranked by the competitiveness index (see Figure 2). London and New York are leading the other cities, with a considerable gap between them and the following two Asian cities of Singapore and Hong Kong. London and New York are referred as ‘NYLON’ to indicate their critical importance in the world city network (Taylor, 2008). The rise of Singapore and Hong Kong well reflects their strategic roles in the Asia Pacific area. Among this group of leading global cities, Sydney and Melbourne are positioned ahead of Shanghai, with Sydney before Los Angeles by a margin. Their dimensional competitiveness varies, compared to the benchmark cities (see Figures 3 and 4).

Governance. Singapore and Hong Kong are leading in the dimension of Governance (both score 29), which comprises indicators of business friendliness, government structure and governance innovation. Their unique jurisdictional structure (special administrative

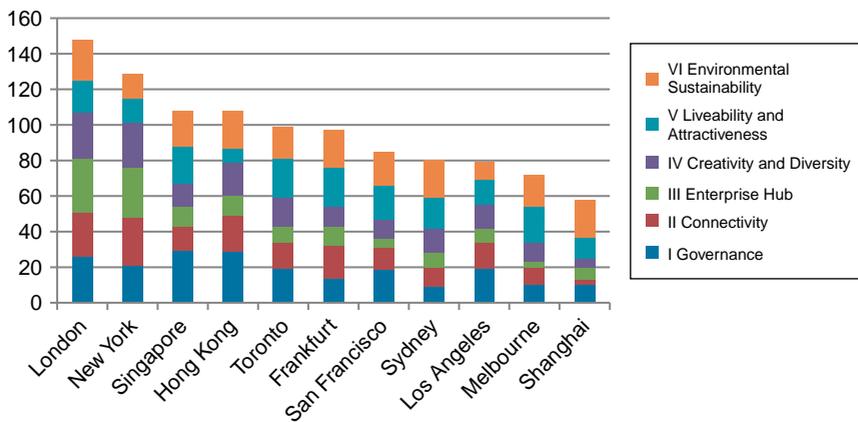


Figure 2. Ranking the competitiveness of global cities

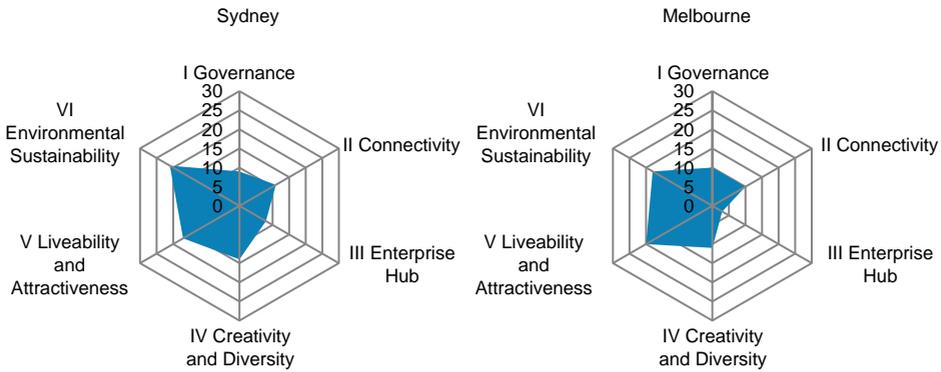


Figure 3. Competitiveness of Sydney and Melbourne

region or city-state) is sometimes thought of as an attributing factor of efficient and effective urban management, controversial notwithstanding. This attribute is not enjoyed by the other global cities. Sydney and Melbourne’s almost equally low status in Governance results from their very low scores in the indicators of government structure and governance innovation. On the contrary, they perform considerably well in the indicator of business friendliness (both score 6). Like all Australian capital cities, neither Sydney nor Melbourne has a metropolitan-level government to assume direct responsibility for city-regional wide planning and development. Australian metropolises are essentially run by the state level governments, which constitutionally hold the urban management power. There are numerous local governments across Australian metropolitan areas, which are creatures of the state, and are very weak in power and resources. In Greater Sydney, there are 43 local government areas, while in Greater Melbourne, there are 31 municipalities. Although it could be argued that the state-led governance arrangement could provide much stronger resources and control over metropolitan strategy, it generates both vertical conflicts (between the state and the local governments) and horizontal fragmentation (between numerous local governments) in metropolitan planning and implementation (Blakely & Hu, 2007). The lack of a metropolitan authority and the multiscalar nature of urban governance are increasingly problematic in tackling the wicked challenges of global competitiveness, sustainability, and social polarisation (Acuto, 2012).

Connectivity. New York and London are leading in the dimension of Connectivity (New York scores 27, London scores 25), including the indicators of physical connectivity, virtual connectivity and metro transport. Both cities are strategic air transport hubs of global importance, and have advanced information and communication technology (ICT) infrastructure and metro transport systems. Sydney and Melbourne are performing considerably well in the indicator of virtual connectivity measured by broadband access (both score 7), but they are comparatively weak in physical connectivity respectively measured by air passengers and internal metro transport system. Globally, neither Sydney nor Melbourne is a leading air transport hub. Nevertheless, the inter-city air connectivity between Sydney and Melbourne is leading in the world, after Hong Kong–Taipei, New York–Los Angeles and New York–London only (Derudder & Witlox, 2008, p. 87).

Sydney and Melbourne are lagging behind in metro transport systems. In the global context, the sprawling urban forms of Australian cities and other New World cities make them less connected internally than their Asian and European counterpart cities (Kenworthy, 2008).

Enterprise Hub. London and New York are ahead of the other cities by far in the dimension of Enterprise Hub (London scores 30, New York scores 28). Studies on global cities' economic strength or their capacity to provide advanced producer services draw similar conclusions (Sassen, 2008; Taylor, 2008; Ni & Kresl, 2010). There is a considerable gap between the two cities and the followers, denoting their dominant positions in providing business services, financial services and cultural services for the global market. As Australia's leading business hub, Sydney is performing considerably well. Sydney links Australian business with the world, and provides services for the Australasian markets, including Australia, New Zealand, South-east Asia and increasingly East Asia. Melbourne ranks the lowest in the three indicators of global service firms, financial flow and cultural industry.

Creativity and Diversity. London and New York are also leading in the dimension of Creativity and Diversity (London scores 26, New York scores 25), largely thanks to their performances in innovation capacity and world class universities. Like the dimension of Enterprise Hub, a considerable gap exists between the two cities and the other global cities in this dimension. However, the differences between cities in the indicator of cosmopolitanism, which is measured by the percentage of foreign-born populations, are not as large as they are in the other two indicators. Except for Singapore and Shanghai, all of the other cities are known for their high degrees of cosmopolitanism. Sydney and Melbourne rank in the middle in the dimension of Creativity and Diversity and its subordinate indicators.

Liveability and Attractiveness. In the dimension of Liveability and Attractiveness, London and New York lose their leading positions. Overall, the differences among the cities are not as marked as they are in the above dimensions of Enterprise Hub, and Creativity and Diversity. Toronto and Frankfurt are leading (both score 22), closely followed by a number of cities including Melbourne and Sydney. Melbourne is ahead of Sydney in this dimension only. Both cities score well in the indicators of cost of living, and health and sanitation. However, they are offset by the comparatively few international visitors to the two cities, which impacts the dimensional score.

Environmental Sustainability. The selected cities do not differ much from one another in the dimension of Environmental Sustainability. Sydney ranks second after London; the latter has the lower private car ownership rate, which is a function of its higher density and more efficient public transit system. The impressive performance of Shanghai in Environmental Sustainability is due to its large population base and high density. Although Shanghai has the lowest score in the indicator of air quality, it is offset by its high scores in the indicators of energy consumption and private car ownership, both of which are per-capita measures. Sydney and Melbourne celebrate good air quality and have average energy consumption rates, but their high private car ownerships impact their overall scores of Environment Sustainability.

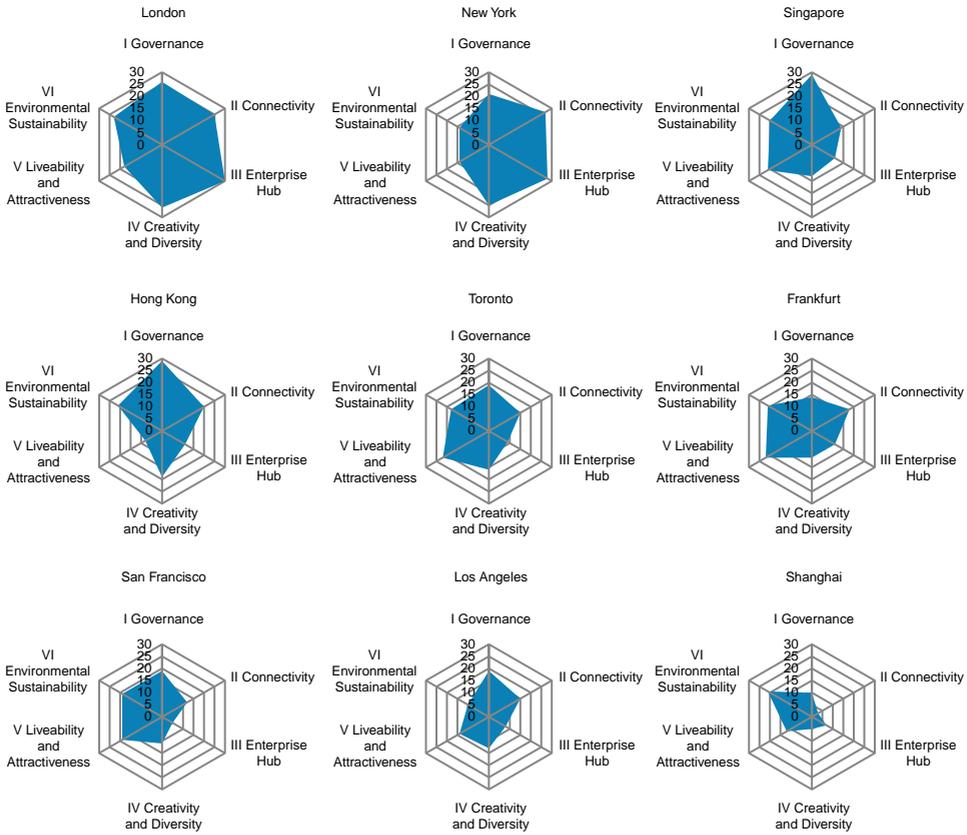


Figure 4. Competitiveness of benchmark global cities

Concluding Discussion

The cities selected in this study are leading global cities. They are strategic nodes of the increasingly integrated world economy, and are important agents of the accelerating process of globalisation. Comparing the competitiveness of Australian cities with them helps understand Australia's connection with contemporary globalisation through its leading gateway cities. As explained earlier, the values of the indicators for one city are calculated relative to the other cities in the group. Consequently, the scores of each dimension and the composite index of integrative competitiveness should be understood in a relative sense. In the global context, Sydney and Melbourne demonstrate relative strength in three dimensions: Liveability and Attractiveness, Environmental Sustainability, and Creativity and Diversity. The findings do not challenge the perception of Australian cities as places of quality lifestyle and of social diversity. In the other three dimensions of Governance, Connectivity and Enterprise Hub, Sydney and Melbourne need to improve, compared to their counterpart global cities, in particular to the leading global cities of London, New York, Singapore and Hong Kong. The less competitive positions of Australian cities in the three dimensions provide meaningful urban policy implications for enhancing their global competitiveness.

The contemporary globalisation and global competition have presented new challenges for governing and planning Australian cities. Governance, coupled with infrastructure provision and concentration development, are the key imperatives for the formation of an Australian paradigm of metropolitan strategic plans (Searle & Bunker, 2010). In the case of Sydney, it is observed that a state-orchestrated urban coalition (including government, private sector, non-government organisations and community groups) mixed with multiscalar politics (federal, state and local) has been emerging, to produce the capacity to govern a ‘global Sydney’ in an environment of competitive globalisation (McGuirk & O’Neill, 2002; McGuirk, 2003, 2004; Hu, 2012b, 2013). Crucial to understanding this, argued by McGuirk (2003, p. 219), is Sydney’s “unique and strategic positioning in global space as Australia’s global city and as a key strategic lever in the pursuit of the national goal of achieving global economic competitiveness”.

McGuirk’s (2003, 2004) attention has been on the importance of coalition politics and partnership in addressing the challenges of the competitive planning and regulatory mechanisms, so as to accommodate global city service industries and their development needs. On the other hand, one frequently debated proposal is that some form of ‘bold’ governance reform, harnessed by a strong political will, is necessary. Although there is no panacea for governance for all cities, people turn to some governance reforms carried out overseas for analogues of Australian cities; for example, the amalgamation of smaller local government areas to form a metropolitan-level government implemented in Toronto and London more than one decade ago. Similar reforms were envisaged for Australian cities, such as a Greater Sydney Authority (Acuto, 2012). Other proposals for governing Australian cities include collaborative governance practices across sectors of government, business and civic society; high and sustained levels of public engagement in decision-making need to be prioritised (Kelly, 2010). Partly in recognition of the impact of the governance mechanism on urban strategies, the Council of Australian Governments (COAG, 2009) has identified strategic planning systems across government agencies as one criterion of the national urban policies for Australian capital cities, which echoes the call for the need for a national urban governance agenda addressing a stifling institutional fragmentation (McGuirk, 2008).

The infrastructures of internal and external connectivity, and digital connectivity, are of crucial importance in supporting a global city’s competitiveness. The infrastructures of connectivity, especially the transport infrastructure to alleviate the heavy traffic to and through the inner-city areas, has been a focal topic of political debates at multiple levels. Searle and Bunker (2010) argue that infrastructure is another important contemporary imperative shaping Australian metropolitan planning, marked by two apparent trends—the privatisation and outsourcing of infrastructure systems and facilities, and the use of public–private partnerships to fund major infrastructure—both of which, however, have been problematical in their outcomes. Politics (at both federal and state levels) is one factor impacting the rationality of decision-making about infrastructure provision and planning. Efficient and effective infrastructure planning and implementation is related to the aforementioned functioning governance arrangement. There is not any question on understanding the imperative to improve the connectivity infrastructures in Australian cities, including the current debates on the National Broadband Network (NBN), metro networks and a second gateway airport for Sydney. The challenge is to effectively engage major stakeholders to formulate a plan with good vision and practicality, and to implement the plan.

The dimension of Enterprise Hub measures a city’s exogenous performances, contrary to a city’s endogenous attributes of Governance and Connectivity. A city’s role as

Enterprise Hub is particularly interrelated to its endogenous attributes, as evidenced in the correlation analysis earlier. The Australian urban policy has aimed at attracting business and economic development, in particular, the regional headquarters of advanced producer services, to locate in Australian global cities in a neo-liberal discourse of competitiveness (McGuirk, 2003, 2004). Much attention has been paid to providing quality environments (governance, infrastructure and liveability) to support and facilitate business activities. The advanced producer service providers follow the markets and clients they serve. Geographical proximity and access to the target market is an important factor in making decisions about office locations of advanced producer services, but the choice of the location of regional headquarters among a group of competing cities is a function of a set of competitive factors. For the cultural and creative service industries that are less dependent on the proximity to the markets they serve, Australian cities have more competitive advantages, as measured in the dimensions of Creativity and Diversity, and Liveability and Attractiveness. This explains why Sydney's performance in the creative cultural and media industries has been more impressive than other advanced producer services, such as accountancy, banking and financing, insurance, law and management consultancy, in the global context (Hu, 2012a).

This study has focused on the Australian cities of Sydney and Melbourne, and ascertained their competitive strengths and weaknesses in a group of leading global cities. The integrative model and its measures have advanced the scholarship on urban competitiveness theoretically and methodologically. It approaches urban competitiveness in an integrative manner, incorporating economic and non-economic perspectives, and including multiple dimensions of a city's exogenous performances and endogenous attributes. This study has clarified the interrelations among the indicators, and among the dimensions, of the integrative model. Using the model for empirical studies provides an evidence-based understanding of a city's competitive strength and weakness, and provides urban policy implications. Using relative metrics for the indicators and dimensions of the model helps better understand a city's position in a group of cities. The model and its measures have a high degree of generalisability—they can be applied to any set of global cities for similar studies.

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Appendix 1. Measures and Data Sources for Indicators of Urban Competitiveness

Indicators	Measures	Data sources
Business friendliness	Ease of doing business: legal and political framework, supporting services, banking support, investor protection, corporate tax, enforcing contracts	MasterCard Worldwide (2008), <i>Worldwide Centers of Commerce Index</i>
Government structure	Governance consolidation and fragmentation: number of local governments by 100 000 population and 1000 km ²	Collected from government websites of case cities
Governance innovation	Digital governance capacity: digital government (delivery of public service) and digital democracy (citizen participation)	Holzer and Kim (2008), <i>Digital Governance in Municipalities Worldwide</i>
Physical connectivity	Air passenger numbers: both origin and destination of air passengers	Derudder and Witlox (2008), "Physical Connection: Airline Networks & Cities"
Virtual connectivity	Broadband access per 1000 people	MasterCard Worldwide (2008), <i>Worldwide Centers of Commerce Index</i>
Metro access	Metro length by km ² area and 10 000 population	http://www.urbanrail.net

(continued)

Appendix 1. (Continued)

Indicators	Measures	Data sources
Global service firms	The presence of global advanced producer service firms: accountancy, advertising, banking/finance, insurance, law and management consultancy	GaWC (2009), <i>The World According to GaWC</i>
Financial flow	Financial flow index: finance-related service capacity and transactions	MasterCard Worldwide (2008), <i>Worldwide Centers of Commerce Index</i>
Cultural industry	Presence of global cultural firms	Krätke (2003), <i>Global Media Cities in a World-wide Urban Network</i>
Innovation capacity	Knowledge creation capacity	MasterCard Worldwide (2008), <i>Worldwide Centers of Commerce Index</i>
World class universities	Number of world top 500 universities	ARWU (2007), <i>Academic Ranking of World Universities</i>
Cosmopolitanism	Percentage of foreign-born population	GW Center for the Study of Globalization (2005), <i>Foreign Born Populations by Cities</i>
Cost of living	Housing, transport, food, clothing, household goods and entertainment	Mercer Human Resource Consulting (2007), <i>Cost of Living Survey—Worldwide Rankings</i>
Health and sanitation	Medical supplies and services, infectious diseases, sewage, waste disposal, air pollution	Mercer Human Resource Consulting (2007), <i>Cost of Living Survey—Worldwide Rankings</i>
International visitors	Numbers of international visitors	Euromonitor International (2007), <i>Top 150 City Destinations</i>
Air quality	Micrograms of particulate matter per cubic metre in air which is suspended in air and less than 10 μm in diameter (PM10)	The World Bank (2007), <i>World Development Indicator</i>
Energy consumption	Annual energy consumption of electricity per capita by kilowatt hour (kWh)	Collected from government websites of case cities
Private car ownership	Numbers of private vehicle ownership per 1000 population	Collected from government websites of case cities

Appendix 2. Scores of Indicators and Dimensions of Competitiveness

Rank	City	Dimensional score	Business friendliness	Government structure	Governance innovation
I Governance					
1	Singapore	29	10	10	9
1	Hong Kong	29	9	10	10
3	London	26	9	9	8
4	New York	21	7	9	5
5	Toronto	19	7	9	3
5	San Francisco	19	6	9	4
5	Los Angeles	19	6	9	4
8	Frankfurt	14	4	7	3
9	Melbourne	10	6	2	2
9	Shanghai	10	1	8	1
11	Sydney	9	6	1	2
Rank	City	Dimensional score	Physical connectivity	Virtual connectivity	Metro transport
II Connectivity					
1	New York	27	10	7	10
2	London	25	9	8	8
3	Hong Kong	20	4	10	6
4	Frankfurt	18	4	6	8
5	Toronto	15	3	9	3
5	Los Angeles	15	6	7	2
7	Singapore	14	3	6	5
8	San Francisco	12	4	7	1
9	Sydney	11	3	7	1
10	Melbourne	10	2	7	1
11	Shanghai	3	1	1	1
Rank	City	Dimensional score	Global service firms	Financial flow	Cultural industry
III Enterprise Hub					
1	London	30	10	10	10
2	New York	28	10	8	10
3	Singapore	11	5	4	2
3	Hong Kong	11	6	4	1
3	Frankfurt	11	3	6	2
6	Toronto	9	4	3	2
7	Sydney	8	2	4	2
7	Los Angeles	8	2	1	5
9	Shanghai	7	1	5	1
9	San Francisco	5	2	1	2
11	Melbourne	3	1	1	1

(continued)

Appendix 2. (Continued)

Rank	City	Dimensional score	Innovation capacity	World class universities	Cosmopolitanism
IV Creativity and Diversity					
1	London	26	10	10	6
2	New York	25	8	10	7
3	Hong Kong	19	5	6	8
4	Toronto	16	3	3	10
5	Sydney	14	3	4	7
6	Singapore	13	6	3	4
6	Los Angeles	13	2	3	8
8	Melbourne	11	1	4	6
8	San Francisco	11	1	3	7
8	Frankfurt	11	4	1	6
11	Shanghai	5	1	3	1
Rank	City	Dimensional score	Cost of living	Health and sanitation	International visitors
V Liveability and Attractiveness					
1	Toronto	22	9	10	3
1	Frankfurt	22	10	10	2
3	Singapore	21	6	8	7
4	Melbourne	20	10	9	1
5	San Francisco	19	8	9	2
6	London	18	2	8	10
7	Sydney	17	7	8	2
9	Los Angeles	14	8	4	2
9	New York	14	4	5	5
10	Shanghai	12	7	1	4
11	Hong Kong	8	1	1	6
Rank	City	Dimensional score	Air quality	Energy consumption	Private car ownership
VI Environmental Sustainability					
1	London	23	9	8	6
2	Sydney	21	9	8	4
2	Shanghai	21	1	10	10
2	Hong Kong	21	7	7	7
2	Frankfurt	21	9	8	4
6	Singapore	20	6	5	9
7	San Francisco	19	9	7	3
8	Melbourne	18	10	6	2
8	Toronto	18	8	9	1
10	New York	14	9	1	4
11	Los Angeles	10	7	2	1