ROAD TO RUIN? HORIZONTAL EQUALISATION OF ROAD GRANT ALLOCATIONS IN EASTERN MAINLAND AUSTRALIAN STATES

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ABSTRACT

Intergovernmental grant funding of local government is not only common in many multi-tiered countries, but often hypothecated on local government infrastructure maintenance and renewal. In Australia, the federal government has been providing grant funding for roads since 1973 through the different state Local Government Grant Commissions. The guiding principle for this distribution of grants has been to enhance horizontal equity in the provision of local government services to all Australians, regardless of where they reside. This objective has particular significance in a commodity based economy which relies on local government for the bulk of its road infrastructure. Moreover, several recent inquiries have suggested that a growing local infrastructure backlog is a problem with national economic ramifications. Against this background, this paper examines whether the grant allocation practices of the three states which account for the bulk of the Australian population and economic activity accord with intended horizontal fiscal equity principles underlying road grant allocations. We present evidence which demonstrates that a lack of consistency and transparency not only undermines equity goals, but also the financial sustainability of individual local authorities.

Keywords: Australia, fiscal equalisation, local government, road grants

INTRODUCTION

Australia has a federal system of government comprised of a national government, eight state and territory governments, and almost six hundred local government entities spread over seven local government systems (McLean 2004). Local government is not recognised in the Australian Constitution and thus exists as a creature of the relevant state government ‘exercising its [limited] powers by delegation from the State and
under the State’s supervision and authority’ (Twomey 2012, 144). The origins of local government pre-date the establishment of the Australian federation in 1901 with its genesis in the form of the 1830’s Road Boards and Roads Trusts. This function, together with waste collection and disposal, still form a significant proportion of the overall functions of Australian local government (Drew and Dollery 2014a).

Scholars of federalism have attributed numerous benefits to the federalist model compared with unitary systems (see, for example, Oates 1972). The principal argument resides in ‘the hope that state and local governments, being closer to the people, will be more responsive to the particular preferences of their constituencies and will be able to find new and better ways to provide these services’ (Oates 1999, 1120). By better aligning public goods and services to local preferences a greater level of welfare can be attained in the absence of economies of scale or interjurisdictional externalities (Oates 1999). More recently arguments in support of federalism have emphasised the innovative capacity of ‘democratic laboratories’ (Bednar 2011) and ‘yardstick competition’ (Boadway and Tremblay 2012). While efficiency arguments based on Tiebout mobility have been advanced in some decentralised systems of government, these arguments have limited relevance in the Australian local government milieu, given the restricted range of services provided by municipalities and the resultant comparatively low property taxes (Drew and Dollery 2014a; Boadway and Tremblay 2012).

Almost all multi-tier systems of government exhibit a degree of vertical fiscal imbalance as a consequence of the fact that central governments typically collect most tax revenue. Since national governments usually possess greater revenue relative to expenditure needs than lower tiers of government, including local government, there is a need for fiscal transfers between the different tiers of government. In Australian federalism, vertical fiscal imbalance has been exacerbated by the fact that the federal government has been the sole collector of income tax since 1942. By contrast, local government is restricted to a land tax imposed on properties within its jurisdiction, as well as a range of fees and charges, but even
property taxes have been capped in New South Wales (NSW) (Dollery, Crase and Johnson 2006).

Equalisation grants in Australian federalism have been implemented ‘as a necessary counterpart to decentralisation, offsetting its tendency to create disparities among regions in the ability to provide public goods or services’ (Boadway 2004, 212). The aspiration underlying fiscal equalisation grants in Australian federalism resides in the claim that ‘a federation with equalised … fiscal capacities is one that, in principle, replicates the equity of a unitary system while at the same time providing the benefits of decentralisation’ (Petchey and Levchenkova 2004, 192). Such a system of horizontal fiscal equalisation (HFE) transfers aims to provide a minimum level of public goods and services to all citizens irrespective of their spatial domicile (Mieszkowski and Musgrave 1999).

This paper examines the operation of road HFE grants through the state Local Government Grants Commissions (LGCC) in the context of the three most populous Australian states. Roads have been selected because (a) in a large commodity based economy, like Australia, road infrastructure plays a pivotal role in economic growth; (b) local government roads comprise about 80% of the total Australian road network (Chakrabarti, Kodikara, Pardo 2002); (c) road maintenance represents a quarter of total municipal expenditure and has been cited as a key factor impinging upon local government financial sustainability (PriceWaterhouseCoopers (PWC) 2006); (d) road grant funding accounts for approximately one third of total federal transfers to local government; and (e) the burden of local road investment and renewal falls especially heavily on rural and remote councils, which typically possess very low population densities and large spatial areas.

It is especially important to note that Australian road grant funding to local government occurs in a financial environment characterised by harsh fiscal constraints. For instance, in its National Financial Sustainability Study of Local Government, PriceWaterhouseCoopers (2006, 111) found that up to 40% of all Australian local authorities ‘could be unsustainable’ and the average annual ‘underspend’ on ‘existing infrastructure renewals’ accounted for between $1.3million and
$1.7 million per municipality. Furthermore, PWC (2006) estimated a national local infrastructure backlog ranging between $12.0 billion and $15.3 billion for all local government jurisdictions, with an annual national shortfall in outlays on existing local infrastructure investment of between $0.9 billion to $1.2 billion.

The states of NSW, Queensland and Victoria which form the focus of our enquiry into road grant HFE have been selected on the basis that they (a) are the most populous jurisdictions in Australia representing a combined 77% of the nation’s population; (b) have all undergone major structural reform to local government through forced mergers (Local Government Reform Commission (LGRC) 2007, Independent Local Government Review Panel (ILGRP) 2013); (c) account for a combined 73% of total Australian national income (ABS 2013). Furthermore, scholars of Australian federalism have long been aware of potential inconsistencies in the distribution of Australian Government transfers by state Local Government Grant Commissions (LGGCs) (Mathews 1978; Mathews and Jay 1997), as well as the impact this may have on the financial sustainability of local councils in the different state jurisdictions (see, for instance, Dollery, Crase and Johnson 2006). However, to date no attempt has yet been made to quantify the magnitude of the problem of state LGGCs applying inconsistent methodologies to road funding (Dollery and Mounter 2010). Accordingly, in this paper we investigate the magnitudes involved.

The paper itself is divided into eight main parts. Section ii provides a synoptic account of the HFE literature and Australian Government legislation on local government transfers. Section iii outlines the models presently used by the LGGCs in NSW, Victoria and Queensland. Section iv describes the empirical strategy employed to assess the consistency of road grant allocations. Sections v and vi detail the results of re-estimating grant funds using the algorithms of Queensland and NSW respectively. Section vii presents a comparison of all three grant allocation methods for the broad strata of urban, rural and regional councils. The paper ends in section viii with some brief
concluding remarks, including some general public policy implications for HFE grant systems.

THEORETICAL FOUNDATIONS AND AUSTRALIAN GOVERNMENT LEGISLATION

As we have seen, Australian HFE is complicated by Constitutional constraints. Since Australian local government systems are ‘creatures’ of their respective states and territories, there is no uncontested mechanism to transfer funds from the federal government directly to municipalities (Dolley, Pape and Byrnes 2008). In general, this obliges the Australian Government to provide funds intended for local government to state and territory administrations to pass on to individual local authorities. However, due to concerns regarding possible violation of state sovereignty – tested in the High Court in 1926 – the federal government has been loath to impose a uniform method of allocation onto the various LGGC (Twomey 2012). This unsatisfactory state of affairs has been the subject of two failed attempts at Constitutional amendment (1974 and 1988) and an aborted attempt in 2013 (Twomey 2013). Thus it would appear that local government will continue to be dependent on LGGC facilitated transfers into the future. This highlights the need for a long overdue empirical assessment of the operation of the municipal HFE in Australia.

Petchey and Levchenkova (2004, 192) have underlined the degree to which Australian equalisation is motivated by equity concerns. However, equity between jurisdictions (in this case municipalities) ‘is difficult to comprehend and it carries with it little ethical force in terms of its policy implementation’ (Buchanan 1950, 586). This has led theorists to assume that ‘different persons should be treated similarly unless they are dissimilar in some relevant respect’ (Pigou 1929, 9). This normative proposition can be interpreted to imply that individuals who are equally well-off before government policy intervention should also be equally well-off subsequent to it (Petchey and Levchenkova 2004; Mieszkowski and Musgrave 1999). Given the traditional egalitarian bias in Australian public policy, this approach has met little resistance (McLean 2004).
Following Buchanan (1950), the equity arguments can be extended at a municipal level to the proposition (Proposition 1) that if two individuals are in an equal position in two identical municipalities in two different states then, for the individuals to remain in equal positions following public policy intervention, it must be the case that the two municipalities receive a transfer which is materially the same. However, in order that ‘an individual should have the assurance that wherever he should desire to reside in the nation, the over-all fiscal treatment which he receives will be approximately the same’ (Buchanan 1950, 589), a second proposition is implied. This suggests that the transfers should ensure horizontal equity within states where broad strata can be readily identified (Proposition 2) (Boadway 2004).

In Australia three local government classifications are conventionally adopted: urban, rural and regional municipalities. Urban areas tend to be clustered around the capital cities which in turn are almost all situated adjacent to the coast. Rural towns cover the bulk of the Australian continent, typically dominated by agricultural and mining activity, whereas regional centres are scattered amongst these small settlements and largely serve as commercial hubs for rural residents. All three strata have distinct demographic profiles which have been summarised in Table 1 following the Department of Planning and Community Development Victoria (2012) classification codes. The existence of three distinct strata suggests the need to determine whether grant allocation methods skew transfers to one or the other of the classifications owing to an exogenous attribute. This represents a subordinate focus of the paper.
Table 1

<table>
<thead>
<tr>
<th>Classification</th>
<th>Population Size</th>
<th>Population Density (persons/km²)</th>
<th>Kerbed Roads (km)</th>
<th>Unkerbed Roads (km)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Urban</td>
<td>128,487</td>
<td>1718</td>
<td>500</td>
<td>184</td>
</tr>
<tr>
<td>Rural</td>
<td>19,080</td>
<td>6.6</td>
<td>102</td>
<td>2,222</td>
</tr>
<tr>
<td>Regional Centres</td>
<td>69,572</td>
<td>71.2</td>
<td>356</td>
<td>1,893</td>
</tr>
</tbody>
</table>

The second approach to horizontal equity delineated above falls in line with existing Australian Government legislation - the Local Government (Financial Assistance) Act 1995 – which defines HFE as that which:

‘(a) ensures that each local governing body in a State is able to function, by reasonable effort, at a standard not lower than the average standard of other local governing bodies in the State; and

(b) takes account of differences in the expenditure required to be incurred by local governing bodies in the performance of their functions and in their capacity to raise revenue’ (Local Government (Financial Assistance) Act 1995, s6(3)).

It should be noted that the legislation only provides for potential ability to deliver local service equality; what actually occurs will be largely driven by local community preferences and municipal fiscal effort (Dollery, Kortt and Grant 2013). In fact to achieve actual service equality ‘would violate the very objective of decentralisation’, for actual service equality implies uniform service levels that would ignore differences in local preferences (Boadway 2004, 215).

Two additional principles are prescribed in Australian Government legislation: consistency and transparency. The need for consistency has been set out in our consideration of the first equity proposition above (Proposition 1) and it is referred to in the legislation to ‘promote consistency in the methods by which grants are allocated to achieve equitable levels of services by local governing bodies’ (Local Government (Financial Assistance) Act 1995, s3(4)(b)).
In regard to transparency, Duran-Vigneron (2012, 101) has noted that ‘a lack of transparency would undermine the credibility of the scheme and would be unacceptable from an equity point of view: a transparent transfer formula defined *ex ante* ensures that local governments are subject to the same rule’. The need for a transparent grants allocation process, in which sufficient information regarding formulae and data are provided to allow for a full comprehension of how and why the quantum of transfer is calculated, is also recognised in Commonwealth statute: ‘Increase the transparency and accountability of the States in respect of the allocation of funds under this Act to local governing bodies (Local Government (Financial Assistance) Act 1995, s3(4)(a))

Moreover, the legislation links transparency to accountability: transparency allows for policymakers, citizens and local authorities to properly assess the equity of a HFE scheme, but it also acts as a disincentive to distortion by the political process in the form of rent extraction (Duran-Vigneron 2012). Accordingly, it represents an important safeguard to the principle of horizontal equity.

Against this background, the focus of this paper falls on the analysis of existing road grant allocation methodologies in the eastern mainland states of NSW, Victoria and Queensland to determine the level of adherence to the principle of HFE in Commonwealth legislation and the institutional constraints of consistency and transparency which underpin its application.

**FULL HORIZONTAL EQUALISATION IN FUNDING MODELS**

It is useful to provide a synoptic description of the LGGC funding models currently employed in the three eastern mainland states. The urban/rural distinction is fundamental to two of the allocation LGGC methods in response to the infrastructure backlog and fiscal viability concerns noted earlier for which degree of urban development is a determinant (see, for instance, Drew, Kortt and Dollery 2014), the key role that rural road infrastructure plays in the nation’s economy and the higher burden roads place on rural local authorities for road
infrastructure by virtue of population size and density. An example of the ramifications of these stresses falling especially on rural local governments can be found in the recent involuntary administration of Central Darling council in rural NSW which was reportedly no longer able to pay municipal staff wages. The Council cited inequitable grant funding allocations as one of the reasons for its insolvency (Brown 2014).

The following descriptions of the three state LGGC methods are taken from the 2010/11 Grant Commission Annual Reports.

**Victorian Road Grant Funding Model**

The Victorian Grant Commission Road Funding model is based on council maintained road length, adjusted for preservation cost and a series of cost modifiers. Preservation costs are stratified as urban or rural and calculated according to range of traffic volume (see Table 2). Cost modifiers include elements for freight loading, sub-grade conditions, climate, materials and strategic routes. A network cost is then calculated as the product of the length of roads, asset preservation cost and overall cost factor. Moreover, an allocation of $60 per square meter for concrete bridges and $100 per square meter for timber bridges is added to the network cost. Total road grant funds are then allocated in proportion to the calculated network costs (VLGGC 2011).

There are a number of problems posed by the Victorian Grant Commission methodology. Firstly, the assigned preservation costs appear to confer additional funds for rural roads with traffic volumes up to 1000 vehicles per day, the same funds for volumes of 1000 to 5000 vehicles per day, but lower funds for volumes in excess of this amount. In fact, rural councils are allocated asset preservation costs of $4100/km lower than urban councils for vehicle traffic over 5000 per day. The fact that preservation costs should be higher in rural councils is consistent with s6(3)(b) of the enabling legislation, which requires recognition of differing cost structures between councils. However, it is hard to understand why rural council preservation costs should not remain higher for the entire range of vehicle traffic. Moreover, aggregating all the councils as
either rural or urban is a crude approximation of the different
cost functions: undoubtedly some local authorities in remote
rural areas would face much higher costs than less remote rural
areas. It also ignores regional centres as the third important
strata.

Table 2
Road Preservation Costs in Victoria

<table>
<thead>
<tr>
<th>Road Type</th>
<th>Daily Traffic Volume Range</th>
<th>Standard Asset Preservation Cost $/km</th>
</tr>
</thead>
<tbody>
<tr>
<td>Urban</td>
<td>&lt;500</td>
<td>$3,600</td>
</tr>
<tr>
<td></td>
<td>500-1000</td>
<td>$4,900</td>
</tr>
<tr>
<td></td>
<td>1000-5000</td>
<td>$6,600</td>
</tr>
<tr>
<td></td>
<td>5000+</td>
<td>$10,700</td>
</tr>
<tr>
<td>Rural</td>
<td>Natural Surface</td>
<td>$350</td>
</tr>
<tr>
<td></td>
<td>&lt;100</td>
<td>$2,500</td>
</tr>
<tr>
<td></td>
<td>100-500</td>
<td>$5,200</td>
</tr>
<tr>
<td></td>
<td>500-1000</td>
<td>$5,800</td>
</tr>
<tr>
<td></td>
<td>1000+</td>
<td>$6,600</td>
</tr>
</tbody>
</table>


The second matter regarding the Victorian model relates
to cost modifiers. Whilst it is important to control for varying
costs associated with freight loading, climate, materials, sub-
grade conditions and strategic routes, it does present a few
problems. One problem relates to the transparency requirement
embedded in the current legislation (s3(4)(a)). Whilst the
VLGGC does provide index numbers, the information regarding
the calculation of each element is so vague as to effectively
make the VLGGC judgement incontestable. For instance, the
VLGGC report states that ‘the raw data for the climate cost
modifier is represented by Thornthwaite Moisture Index
Numbers’ (VLGGC, 2011, p 110). However, for actual detail
regarding the quite complex index algorithm one would need to
consult the academic literature, and even then there is a degree of
uncertainty given that the index has been subsequently refined,
simplified and otherwise altered (see, for example, Gentilli
1972). Secondly, only one value for each cost modifier element
is recorded for each council. In the case of spatially large councils, such as Mildura (2,208,250 ha), it is difficult to believe that there would not be a number of different sub-grades, freight loads and climatic conditions. Finally, the climate modifier relates to moisture only. However, the academic literature has identified thermal stress as an important predictor of road failure (Chakrabarti, Kodikara and Pardo 2002).

The final problem posed by the VLGGC approach occurs due to the allocation of bridge costs directly to the network cost. This implies that the expenditure associated with bridges is independent of traffic volume and the various cost modifiers, which is unlikely to be the case.

Although problems undoubtedly exist in relation to the VLGGC methodology, it can be argued that their approach is superior to that of the other two states, except for what Duran-Vigneron (2012) argues to be the most important institutional constraint: transparency. This could be improved by providing more information and data on exactly how index numbers are calculated. In addition, adjusting and justifying the preservation cost rates and adding a traffic volume factor for bridge costs would also improve the method (other alternatives are explored at the end of section iii).

Queensland Road Grant Funding Model

The Queensland Local Government Grant Commission (QLGGC) model draws no distinction between rural and urban councils. It also contains no cost modifiers for climate, geology, freight or strategic routes. Nor does the model contain a preservation cost based on the volume of traffic. Section 2.4 of the QLGGC report (2011) states that the road funding is allocated simply according to council road length (62.85% weighting) and local government area population (37.15% weighting). Population size is based on Australian Bureau of Statistics (ABS) data (QLGGC 2011, 15).

Perhaps the most commendable aspect of the QLGGC model is its high level of transparency, consistent with the pressing institutional constraint embodied in s3(4)(a) of the enabling legislation. However, three problems are immediately apparent. Firstly, there appears to have been no effort to abide by
the principle of HFE within the state as per s6(3)(a). In the absence of cost modifiers or preservation cost indexes, one can only assume that the QLGGC believes that each and every council faces exactly the same cost structure for road maintenance. Secondly, the high weighting for population size (37.15%) skews the funding allocation in favour of urban and regional centre councils. Moreover, it carries an implicit assumption that traffic volume is somehow closely correlated to population size. However, no evidence is provided to support this assumption. Finally, the QLGGC model may produce inconsistent results given its reliance on ABS population statistics. In a recent ABS report, intercensal error ranging from 15.2% for populations less than 2,000 down to 2.4% for populations exceeding 20,000 was identified (ABS 2012). Rural councils are likely to be most heavily affected by this problem.

**NSW Road Grant Funding Model**

Appendix 8 of the NSW Local Government Grant Commission report (NSW LGGC 2011) details its method for allocating federal road grant funds. The gross NSW road fund allocation is first divided into an urban pool (27.54%) and a rural pool (72.46%). Urban grant pool funds are then allocated on the basis of 5% for bridge length. The remaining 95% is allocated according to road length (60%) and population (40%). Rural road pool funds are allocated on the basis of 7% for road bridge length. The remaining 93% is allotted according to road length (80%) and population (20%).

The NSW LGGC method has a slight degree of HFE within the state between the crude categories of rural and urban councils, but once again the distinct strata of regional centre is ignored. However, there is a great deal of heterogeneity within each of the broad categories, which cannot be captured by road length and population alone, and this is likely resolved into a myriad of cost functions, revenue raising abilities and service standards. The lower weightings assigned to the rural population size parameter is likely to result in less skewing to regional centres. However, it will still be present to a certain degree. The NSW LGGC provides no justification for the actual weightings assigned, which opens up concerns regarding the transparency of
the process. Finally, the NSW LGGC method also relies on ABS population data and is thus subject to accuracy problems in intercensal years (ABS 2012).

Focus on the Principles Underwriting Horizontal Fiscal Equity: Consistency and Transparency

Evans (1991) has observed that ‘there is no single correct principle for grant distribution’. However, the degree of variation between the three models is astounding in light of the requirement of the legislation to ‘promote consistency in the methods by which grants are allocated’ (Local Government (Financial Assistance) Act 1995, s3(4)). This lack of consistency is critical given that it is a necessary prerequisite for Proposition 1. Nevertheless, all three models share common features. Firstly, they all use unaudited council supplied data which may contain significant errors to varying degrees. Victoria has, by far, the highest risk associated with such data (via traffic volume data) followed by Queensland (road length data). Secondly, all three models fail to account for revenue raising ability, which is an element of the enabling legislations definition of HFE (Local Government (Financial Assistance) Act 1995, s6(3)(b). Finally, all three models are liable to the inaccuracies associated with ABS population intercensal error – this is greatest for Queensland and NSW, but also applies to Victoria in as much as the initial interstate allocation is subject to this problem.

The solution to the problem of horizontal equity being undermined by a lack of consistency is for either (a) a single method being spelled out in federal legislation; (b) constitutional reform; or (c) empirical studies, quantifying the effect on the fiscal position of local authorities. For reasons discussed in Section ii the first two options are unlikely to eventuate, which underlines the need for empirical work, such as that presented in this paper in ensuring the HFE objective is monitored. With respect to interstate HFE between the three broad strata, our analysis provides a clear indication of the likely skewing of transfers towards urban centres in two of the LGGC methodologies. One way of addressing this violation of Proposition 2 is to allocate road grant funds in proportion to the moving average of actual road expenditure as per audited
financial statements: this automatically adjusts for input costs and increased maintenance required as a result of geology, climate or usage without the use of complex indices (which may or may not accurately represent reality). A moving average (of perhaps three years) is advocated in an attempt to thwart gaming by municipal managers: any attempt to increase the proportion of funding by inflating road expenditure would have to be sustained over a period of a number of years to yield results. However, at present consistent functional reporting of local government expenditure does not occur – neither within states or between states – and thus accounting standards would have to be addressed as part of this exercise (Drew and Dollery 2014b). This obstacle would be best overcome through having the Australian Accounting Standards Board (an institution established by federal legislation) amend the relevant standards. Apart from the horizontal equity advantages of this proposal, it would serve to focus attention onto road infrastructure: municipalities would be rewarded proportionally on the effort they put into maintaining infrastructure. Inefficient practice would still be discouraged by the fact that councils would only receive a portion of actual costs via the transfer system. If it were believed that certain strata had higher needs for funding, then this could be accomplished by an initial division into the three strata in a manner similar to the NSWLGGC practice. However, it would be critical to make this division on the basis of empirical data (for instance, in proportion to non-discretionary spending per capita) rather than an arbitrary number.

EMPIRICAL STRATEGY

The empirical strategy developed for this paper seeks to answer (a) whether individuals of equal circumstances but residing in two separate municipalities (with identical relevant parameters) in two different states are likely to remain in equal circumstances following public policy intervention (Proposition 1) and (b) whether HFE occurs within states according to the three broad strata of urban, rural and regional (Proposition 2). To investigate the first question we take the cohort of Victorian councils and re-assess their road grant allocations according to
the Queensland and NSW algorithms. In this way one can assess whether identical municipalities are treated equally regardless of their state domicile. To address the second proposition, we first stratify the Victorian cohort into rural, regional and urban councils according to the Department of Planning and Community Development Victoria (2012) classification codes, which are based on the Australian Local Government Classification codes. This will provide empirical support for our analysis in Section iii.

The re-estimates were subsequently summarised according to variance (defined as the real difference between Victorian allocation and the given comparative model), the percentage variance to Victorian allocations and the percentage variance to Victorian council operating results. A positive variance indicated that the figure re-estimated using the comparative LGGC model was greater than the Victorian allocation. The percentage variance to operating result has been included as an indicator of the effect that the alternate models may have had on a given operating result and, as such, is purely hypothetical; the statistic simply serves to underline the relative importance of the inconsistency in grant allocation models (and how this undermines HFE). Percentage variance to operating result is presented in absolute terms only, due to the fact that operating results may be either negative (deficit) or positive (surplus).

Finally, a three state comparison was conducted. This comparison plotted the results from each of the councils after applying the two alternative grant funding algorithms. The comparison was also stratified into urban, rural and regional centres (according to Department of Planning and Community Development Victoria (2012), classification codes) in recognition of the specific challenges facing the strata and our previous discussion of how the existing algorithms may be expected to skew funding towards centres with high populations.
VICTORIAN COUNCILS RE-ESTIMATED USING QUEENSLAND ALGORITHM

Table 3 presents the results of Victorian council road grants re-estimated using the QLGGC method. The first row presents overall data for the state and subsequent rows are the stratifications discussed in section ii. It will be noted that the mean variance is 0, which tells us that the two methods both exhaust the entire state road fund allocation, as they should if our application of the QLGGC algorithm is correct. The only other remarkable feature of the first row is the size of the standard errors which suggest an extremely high level of volatility between the two models.

Table 3
Victorian Councils Re-estimated Using Queensland Algorithm

<table>
<thead>
<tr>
<th>Measure of Central Tendency</th>
<th>Variance ($)</th>
<th>Percent Variance to Victoria</th>
<th>Percent Variance to Operating Result (absolute value)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>0.0</td>
<td>21.57</td>
<td>40.80</td>
</tr>
<tr>
<td>Median</td>
<td>-36,671</td>
<td>-3.3</td>
<td>7.3</td>
</tr>
<tr>
<td>Standard Deviation</td>
<td>737,319</td>
<td>61.57</td>
<td>194.24</td>
</tr>
</tbody>
</table>

Urban

<table>
<thead>
<tr>
<th>Measure</th>
<th>Variance ($)</th>
<th>Percent Variance to Victoria</th>
<th>Percent Variance to Operating Result (absolute value)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>516,473</td>
<td>72.25</td>
<td>8.36</td>
</tr>
<tr>
<td>Median</td>
<td>583,765</td>
<td>72.87</td>
<td>5.23</td>
</tr>
<tr>
<td>Standard Deviation</td>
<td>458,395</td>
<td>57.54</td>
<td>11.01</td>
</tr>
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</table>

Rural

<table>
<thead>
<tr>
<th>Measure</th>
<th>Variance ($)</th>
<th>Percent Variance to Victoria</th>
<th>Percent Variance to Operating Result (absolute value)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>-457,103</td>
<td>-18.53</td>
<td>77.36</td>
</tr>
<tr>
<td>Median</td>
<td>-425,495</td>
<td>-24.88</td>
<td>17.94</td>
</tr>
<tr>
<td>Standard Deviation</td>
<td>710,169</td>
<td>30.03</td>
<td>284.72</td>
</tr>
</tbody>
</table>

Regional

<table>
<thead>
<tr>
<th>Measure</th>
<th>Variance ($)</th>
<th>Percent Variance to Victoria</th>
<th>Percent Variance to Operating Result (absolute value)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>-6,495</td>
<td>-3.32</td>
<td>15.50</td>
</tr>
<tr>
<td>Median</td>
<td>-107,686</td>
<td>-7.05</td>
<td>4.26</td>
</tr>
<tr>
<td>Standard Deviation</td>
<td>466,886</td>
<td>21.34</td>
<td>35.96</td>
</tr>
</tbody>
</table>

The positive variance and percentage variance figures for the urban strata suggest that the Queensland model allocates a higher level of funding to urban councils than the VLGGC
model. This is principally due to the high weighting given to population in the QLGGC model. As predicted in section iii, the use of a high population weighting (37.15%) skews funding towards high population councils, such as those in urban areas. It thus has the potential to create inequity for residents in rural and regional municipalities and this is supported by the evidence presented. The standard deviation is less than the mean and median suggesting that the trend to higher funding for urban councils under the QLGGC model has very few exceptions. The percentage variance is striking in how much difference exists between the two models (on average approximately 72%). Finally, the percentage variance to Operating Result suggests that these funding differences could affect the bottom-line of councils by a significant margin of 5 to 8%.

The statistics derived for the rural strata suggest that, on average, the QLGGC model allocates fewer funds to rural councils than the VLGGC model. However, the higher standard deviation indicates that there are some exceptions to this trend. Once again the percentage variance is high and suggests little consistency between the models. Finally, the mean and median percentage variance to operating result suggests that the variation in grant allocation algorithms is likely to have a very large effect on rural council bottom lines (approximately 18 to 77%). One of the reasons as to why the variance has such a high effect on operating results is the smaller revenue base, and thus relatively higher reliance that rural councils have on grant funding (Dollery, Garcea and LeSage 2008). Given the financial sustainability concerns expressed particularly for rural councils (see, for example, Drew and Dollery 2014; LGRC 2007), this is a finding of major significance. It suggests that the financial sustainability problems of Queensland rural councils may be due, at least in part, to the method for allocating road grant funding.

The relatively high standard deviation for regional centre statistics suggests a mixed bag. However, the mean and median indicate that - on average - regional centres receive relatively less road grant funds under the QLGGC model. This sort of result is expected given that regional centres tend to have higher population size (mean of 69,572) than rural areas (mean 19,080),
but less than urban (mean 128,487). The possible effect on operating result is much lower than that of rural councils, but still quite significant – reinforcing the fact that consistency in road grant funding is an important issue – because without consistency it is impossible to argue that allocations are equitable under Proposition 1.

**VICTORIAN COUNCILS RE-ESTIMATED USING NSW ALGORITHM**

One of the principal differences between this comparison and that of section v resides in the almost universally (the exception being regional centres) lower standard deviations. This suggests much less volatility between the two methods under consideration here.

For the urban strata the NSWLGGC still allocates higher funds (on average) than the VLGGC model. However, the size of the variance is much smaller and this is reflected in the lower percentage variance (approximately 18 to 19%) and lower percentage variance to operating result (1.24% to approximately 3%). The same comments essentially apply to the rural strata which - on average - allocate fewer funds under NSW LGGC model, but with lower levels of variance (the average variance is not particularly high but for some small councils, such as Central Darling, $200,000 annually is doubtless significant). However, the various measures of variance for the regional centres suggest that the NSW LGGC model tends to allocate extra funds - on average - when compared with the VLGGC algorithm.
Table 4  
*Victorian Councils Re-estimated Using NSW Algorithm*

<table>
<thead>
<tr>
<th>Measure of Central Tendency</th>
<th>Variance ($)</th>
<th>Percent Variance to Victoria</th>
<th>Percent Variance to Operating Result (absolute value)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>0</td>
<td>7.82</td>
<td>30.21</td>
</tr>
<tr>
<td>Median</td>
<td>30,416</td>
<td>2.98</td>
<td>2.96</td>
</tr>
<tr>
<td>Standard Deviation</td>
<td>538,705</td>
<td>28.22</td>
<td>146.83</td>
</tr>
<tr>
<td>Urban</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>88,775</td>
<td>19.29</td>
<td>3.02</td>
</tr>
<tr>
<td>Median</td>
<td>139,179</td>
<td>17.88</td>
<td>1.24</td>
</tr>
<tr>
<td>Standard Deviation</td>
<td>271,323</td>
<td>23.39</td>
<td>5.75</td>
</tr>
<tr>
<td>Rural</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>-199,603</td>
<td>-5.51</td>
<td>58.24</td>
</tr>
<tr>
<td>Median</td>
<td>-170,060</td>
<td>-9.8</td>
<td>6.16</td>
</tr>
<tr>
<td>Standard Deviation</td>
<td>640,729</td>
<td>29.21</td>
<td>214.15</td>
</tr>
<tr>
<td>Regional</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>394,993</td>
<td>18.05</td>
<td>17.54</td>
</tr>
<tr>
<td>Median</td>
<td>378,368</td>
<td>21.07</td>
<td>2.96</td>
</tr>
<tr>
<td>Standard Deviation</td>
<td>508,172</td>
<td>18.83</td>
<td>46.68</td>
</tr>
</tbody>
</table>

The relatively lower variance in the NSW LGGC model when compared to section v is mainly due to the lower weighting assigned to population under the NSW model (effectively 10.47% for urban and 13.48% for rural and regional centres when calculated on gross road funds). This predictably results in less skewing to councils with a higher population size. The higher effective weighting for the NSW LGGC rural algorithm is surprising and it appears to be an unintended consequence of the two-stage distribution of funds.

**CONSISTENCY IN ROAD GRANT FUND ALLOCATION - COMPARISON BY COUNCIL TYPE**

Section v and Section vi have compared NSW LGGC and QLGGC individually with the VLGGC allocations. However, it is still necessary to compare all three models to one
another. Figures 1, 2 and 3 provide comparative polygon charts for each of the councils represented in the three strata: urban, rural and regional.

Figure 1

*Urban Road Grant Comparison – Victoria, Queensland and NSW*

The results displayed in Figure 1 are unsurprising given the preceding discussion. In essence, the graphs illustrate that the QLGCC provides far higher levels of road funding for urban councils than the NSW LGGC, and the NSW model provides slightly higher levels than the Victorian algorithm.

When it comes to the rural strata the exact opposite is true. The Queensland funding model produces the lowest allocations, followed by the NSW algorithm, then the Victorian model. This is perhaps a significant factor in the fiscal stress widely reported to exist amongst NSW and Queensland rural councils (see, for instance, the ILGRP 2013 or LGRC 2007).
Finally, for regional centres the various road grant fund allocation models produce a real mixed bag of comparative results. However, it could be concluded that the NSW model does provide the highest level of funding for regional centres.

Taken as a whole the empirical estimation presents clear evidence that any two equally well-off individuals living in two different (but essentially identical) municipalities located in any two different states of eastern mainland Australia are not likely to be in equal positions following federal road transfers. Moreover, the stratified data confirms that horizontal equity between the broad strata of urban, rural and regional centres is distorted by algorithms which include population as a factor.
LESSONS ON THE IMPLEMENTATION OF HORIZONTAL FISCAL EQUITY TRANSFERS

HFE transfers to Australian local authorities are motivated by equity concerns. Following Buchanan (1950), the conceptual rationale for such transfers has been based on the normative egalitarian proposition that people in like circumstances should remain in like circumstances following public policy intervention. Due to Constitutional constraints in Australia, this argument must be stated in two propositions. Proposition 1 states that if two individuals are in an equal position in two identical municipalities in two different states, then for the individuals to remain in equal positions following public policy intervention, it must be the case that the two municipalities receive a transfer which is materially the same. The Proposition 2 states that grant transfer formulae should be constructed in such a manner so as to ensure there is no skewing towards any of the broad strata on the basis of exogenous attributes.

Our analysis of the formulae used by the three state LGGCs clearly showed that the first proposition is routinely violated, despite the injunctions made in the enabling federal legislation. The analysis of extant LGGC algorithms also
indicated skewing towards centres with high populations and small road infrastructure burdens in violation of Proposition 2. This finding was consistent with Twomey’s (2012, 180) claim that ‘rivers of gold might yet turn to rivers of tears for local government bodies in the more populous areas if an equalisation approach to direct funding was taken by the Commonwealth’. Finally, options to address the failure to achieve Proposition 1 (more prescriptive legislation, constitutional reform and greater oversight) and Proposition 2 (the use of the moving average of actual road expenditure) were canvassed.

We then conducted empirical estimations designed to quantify the effect of violating HFE principles for the three disparate strata of urban, rural and regional councils. Consistent with our analysis of the three models, we found evidence that use of the various methodologies resulted in very significant differences in the grant transfers, the greatest of which meant a mean impact on the operating result of rural councils in the order of 77% (or $457,000 p.a.). For a commodity based economy with significant road infrastructure backlogs, this result not only exposes a flaw in Australian Government attempts to provide horizontal equity, but also provides the first empirical evidence for why the road infrastructure backlog and municipal fiscal distress in NSW and Queensland is felt most keenly in rural local authorities (ILGRP 2013, LGRC 2007).

In broader terms, the empirical evidence presented in this paper can inform the practice of HFE in other local government jurisdictions in other countries. In the first place, our results provide evidence against the use of population size as a factor in grant allocation algorithms if HFE across the broad strata of urban, rural, regional is to be maintained. Secondly, it was argued that complex indices not only make review difficult, but also create transparency problems which may facilitate political controversy and rent extraction. They may also bear little resemblance to the actual cost pressures facing municipalities. A better solution might be to use the moving average of audited road expenditure for councils as the basis for determining the proportion of transfers to be allocated. This would have the advantage of rewarding actual effort on road infrastructure and steps could be taken to address need through
an initial division according to each stratum’s proportion of per-capita non-discretionary expenditure.

Finally, this study demonstrates that it is not enough to legislate for the principles underpinning HFE: equity can only be ensured through regular empirical review and this is largely dependent on transparency. Moreover, it is unlikely that any static system of transfers can ever provide horizontal fiscal equity for an indefinite period of time. We must thus be prepared to adjust practice as new information and methods come to light.
REFERENCES


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