Full, efficient and other fiscal equalisation schemes: principles and Australian practice

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Abstract: Buchanan (1950, 1952) and Boadway and Flatters (1982) found that, in a federation, differences between states in their fiscal capacities should be fully equalised through a system of transfers. This was to promote horizontal equity between comparable individuals in different states and/or to promote locational efficiency in how those individuals distributed themselves between states. While some countries have practised partial equalisation, Australia is the country that came closest to full equalisation (Spahn, 2007).

This preference for full equalisation has been challenged by theory and practice. Albouy (2012) finds that residence-based taxes should not be equalised. In 2026/27, Australia completed a transition from full equalisation to 'standard state' equalisation.

This paper develops and applies principles for fiscal equalisation that are efficient, comprehensive and practical. We find that it is efficient for each state to offer the same labour type the same nominal net fiscal benefit, leading to practical principles for fiscal equalisation. While Boadway and Flatters (1982) and Albouy (2012) take polar positions on equalisation of residence-based taxes, we find that they should be equalised, but only for the effects of population composition. This is also true for the variable costs of government services. Source-based taxes and government fixed costs should be fully equalised. These efficient equalisation principles support locational efficiency for labour, while other government transfers achieve vertical equity and interstate migration horizontal equity.

Under Australia's new standard state system, no state can be assessed to be fiscally stronger than the stronger of the two most populous states, NSW and Victoria. Compared to full equalisation, this benefits Western Australia because mining royalties make it the fiscally strongest state. In 2018, the Productivity Commission (2018, 2026) recommended a grants system, while in 2026 it recommended a return to full equalisation.

This paper uses the Commonwealth Grants Commission assessment for 2026/27, together with Census data, to estimate the effects on consumer welfare of alternative equalisation policies. Compared to full equalisation, we estimate an annual welfare gain of $280 million for moving to efficient equalisation or $205 million for a second-best policy of 70% equalisation. In contrast, there are welfare losses from moving to the standard state system, the grants system or minimal equalisation of $240 million, $259 million and $921 million respectively.

Key words: fiscal equalisation, Federalism, Intergovernmental relations, Australia

JEL Codes: D61, H77, J61

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1 INTRODUCTION

Most federations use some system of fiscal equalisation to address concerns that states have different fiscal capacities. This is consistent with Buchanan (1950) who was concerned that economic forces had "tended to concentrate high income earners in specific geographic areas" leading to "inter-regional disparities in fiscal capacity". He proposed the principle that fiscal equalisation be used to "allow state units originally unequal in fiscal capacity to provide equal services at equal rates of taxation".

Originally, Buchanan (1950) showed how fiscal equalisation could support horizontal equity between comparable individuals in different states. Later, Buchanan (1952) showed how fiscal equalisation could also support locational efficiency in how those comparable individuals distributed themselves across states.

The Australian Government enshrined this principle of full fiscal equalisation in legislation in 1978. Its motivation was horizontal equity rather than locational efficiency of labour.

> The principle that the respective payments to which the States are entitled under this Act should enable each State to provide, without imposing taxes and charges at levels appreciably different from the levels of the taxes and charges imposed by the other States, government services at standards not appreciably different from the standards of the government services provided by the other State (Australian Government, 1978).

This legislation was implemented by the Commonwealth Grants Commission (CGC), which was established in 1933 (Williams, 2005). Under full equalisation, the CGC distributed general revenue payments to states by starting with an equal per capita distribution and then altering that distribution to equalise state fiscal capacities. In effect, this equalisation process entailed funds being transferred from fiscally advantaged donor states to fiscally disadvantaged recipient states until fiscal capacities were equalised.

Spahn (2007, p.93) has approvingly identified the Australian system as the world's most comprehensive system of fiscal equalisation.

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> Despite shortcomings such as a high degree of complexity, the Australian system has become *the* model for an ideal equalisation system. The basic approach is sound, complete, feasible, and reasonably transparent…the unique benchmark against which all equalisation mechanisms have to be compared in terms of their vulnerability to manipulation and perverse incentives.

This preference for full equalisation has been challenged both in the literature and in the Australian policy debate. This paper considers both.

Equalisation Principles

As noted above, the theoretical grounds for full fiscal equalisation have shifted. Originally, Buchanan proposed his equalisation principle on the horizontal equity grounds of "equal treatment for equals" (Buchanan, 1950, p. 587). However, the free movement of labour between the states of a federation allows comparable people to achieve horizontal equity among themselves while allowing for all factors that influence their welfare, not just state government services and taxes.

Later, Buchanan (1952) demonstrated that the principle of "equal treatment for equals" could promote locational efficiency of labour. Indeed, Boadway and Flatters (1982) developed a theoretical model with heterogeneous individuals and found that "the equalisation program that is called for on efficiency grounds is one that fully equalises per capita revenues from both source-based and residence-based taxes".

Full equalisation of the capacity to raise revenue was needed so that location decisions for each type of labour were determined in the labour market and were not distorted by differences between states in net fiscal benefits. By net fiscal benefits we mean the difference between value of public services a household receives and the residence-based taxes it pays.

Albouy (2012) extended the model of Boadway and Flatters (1982), including by introducing interstate differences in government productivity and consumer amenity, leading to different conclusions on fiscal equalisation. For example, it is inefficient to equalise for lower wages if they have been willingly accepted in return for higher amenity. Albouy (1982) concludes: "unlike influential work by Buchanan (1950) and Boadway and Flatters (1982), I argue that, when properly interpreted, this same framework actually only supports the equalisation of source, and not residence-based revenues".

This paper develops and applies principles for fiscal equalisation that are efficient, comprehensive and practical. To do this, it extends Albouy's (2012) model in three ways while also making some simplifications. Our model allows us to demonstrate more fully how equalisation should apply to government spending. It also allows us to show that equalisation for residence-based taxes should be limited to the effects of population composition, which lies between the polar positions of Boadway and Flatters (1982) and Albouy (2012). Our model

also introduces a consumption tax to the equalisation analysis. Our modelling simplifications are relatively minor and are designed to make the equalisation principles more practical.

The first extension models government expenditure in more detail. We allow usage of government services to vary between types of individuals and we allow for both fixed and variable costs in producing those services. This detail exposes the areas where it is efficient to equalise government spending.

The second extension introduces a consumption tax. The Goods and Services Tax (GST) plays a central role in fiscal equalisation in Australia, and other federations also have consumption taxes. Hence, a consumption tax needs to be introduced for the fiscal equalisation principles to be complete.

The third extension distinguishes fiscal equalisation transfers from central and state government transfers that redistribute between labour types. This better distinguishes the role of fiscal equalisation transfers, allowing us to reach a clear conclusion on the efficient form of equalisation for residence-based taxes.

The model leads to a general rule for efficient fiscal equalisation. Each state offers the same type of labour the same dollar value of government services net of taxes, or nominal net fiscal benefit. This is efficient because it removes nominal net fiscal benefits as a motive for interstate migration. It is then possible for labour location decisions to be driven efficiently by labour market conditions in each state.

This general rule of a uniform nominal net fiscal benefit for a given labour type leads to a set of four equalisation principles covering state government expenditures and taxes. These principles are embedded in a formula for efficient fiscal equalisation transfers.

The first principle is full equalisation for source-based taxes, echoing the findings of previous authors including Boadway and Flatters (1982) and Albouy (2012). These taxes, such as those applied to mineral resources and land, raise revenue from non-residents and so need to be fully equalised so states have the same capacity to provide net fiscal benefits to residents.

The second principle is full equalisation of the fixed costs of government. This ensures that those fixed costs are shared nationally on an equal per capita basis and so do not distort locational choices of labour at the margin. While this maybe a new finding at the theoretical level, this form of equalisation is discussed in Spahn (2007, p. 90) and has always been practised in Australia, where it is known as equalisation for administrative scale.

The third principle refers to residence-based taxes such as those on resident income and consumption. There should be equalisation for the influence of population composition, but not for other factors affecting the capacity to raise revenue from residence-based taxes. This finding of limited equalisation of residence-based taxes lies between the findings of Boadway

and Flatters (1982) and Albouy (2012). As noted above, Boadway and Flatters (1982) found that residence-based taxes should be equalised except under the unrealistic assumption that labour is homogeneous, while Albouy found against equalisation of residence-based taxes.

On the one hand, Albouy (1982) was correct that equalisation of residence-based taxes for lower state income is bad policy when that lower income arises from higher amenities. On the other hand, Buchanan (1950) was correct that such equalisation is good policy when lower state income arises from more skilled labour choosing to live elsewhere. We also show that the model in Albouy (2012) supports limited equalisation if we extend it by taking its single category of government transfers and then separate fiscal equalisation transfers from central and state government transfers that target vertical equity.

The third principle is that the variable costs of government services should be equalised for the influence of population composition but not of other factors. That is, the variable costs of government services should be equalised in the same way as residence-based taxes. Boadway and Flatters (1982) and Albouy (2012) do not consider equalisation of government services for population composition because they assume that everyone in a state receives the same level of government services. However, in Australia, population composition makes an important contribution to equalisation transfers (Table 3A), particularly through the combined effect of wide variation in the indigenous shares of state populations and the high needs of the indigenous for government services.

This third principle implies that there should be no equalisation for non-demographic factors that influence the variable cost of government services. This includes no equalisation for the input costs of government services because the general rule calls for a uniform nominal (not real) net fiscal benefit for a given labour type. A similar point was stressed by Albouy (2012).

The third and fourth principles are connected. We refrain from equalisation for non-demographic factors in these two areas to establish an efficient connection *at the margin* between the variable costs of government services and the charging of a state's residents for those services through residence-based taxes. This resembles the user pays approach stressed by Albouy (2012).

By the same token, it is important to equalise for demographic factors affecting the capacity to raise residence-based taxes and/or the needs for government services. As Buchanan (1950) explained, this is so the decisions that higher skilled workers make about where to locate do not result in "inter-regional disparities in fiscal capacity".

These four fiscal equalisation principles support locational efficiency of labour within a broader policy framework. Locational efficiency of capital requires that, if there are state corporate taxes, the state tax rates are harmonised (Boadway and Flanders, 1982). Free interstate migration is needed to achieve horizontal equity for each labour type. As for vertical equity, it is achieved by central government redistributive transfers combined with the

redistribution generated by state government patterns of spending and taxation. To the probably small extent that the amount of redistribution varies between state budgets, in principle the effects of this on efficiency and equity can be neutralised through state redistributive transfers.

Australian Equalisation Policies

The Australian system of full equalisation survived until complaints from the fiscally strongest state, Western Australia. Those complaints led to an Inquiry by the Productivity Commission (2018) that recommended the introduction of a grants-based system of equalisation. A grants system would change the equalisation process so that equalisation payments to recipient states are funded from the pool of general revenue payments rather than by donor states.

Instead of adopting a grants system, the Australian government decided to transition from full equalisation to standard state equalisation. The transition began in 2021-22 and was completed in 2026-27 (CGC, 2021). Under this system, the standard state is either NSW or Victoria, whichever is fiscally stronger. No state can be assessed to be fiscally stronger than the standard state. This cap on assessed fiscal strength benefits Western Australia because it is the fiscally strongest state.

Historically some donor states, such as NSW, have advocated for the virtual abolition of fiscal equalisation. So, this paper also assesses a system of minimal fiscal equalisation that abandons all equalisation except for indigeneity.

This paper quantifies the effects on consumer welfare in Australia of the alternative proposed equalisation schemes. These welfare effects are estimated using the latest CGC application year, 2026/27. The first step is to use our formula for efficient equalisation to obtain the welfare-maximising transfers in that year. In the second step, the welfare loss from departing from those efficient transfers under each alternative equalisation scheme is quantified.

In the first step, we need to apply limited equalisation as part of estimating the efficient transfers. To do that, we use the 2021 Census, as the results from the 2026 Census are not yet available, to estimate the impact of each state's population composition on its ability to raise revenue from residence-based taxes.

Population compositions are characterised using the three attributes of age, educational attainment and indigenous status. The capacity to raise revenue from residence-based taxes is assessed from personal incomes and how they vary with the three attributes at the national level. Equalisation is then applied for differences in state per capita personal incomes to the extent that those differences are explained by the differences in state population compositions. There is no equalisation for other sources of state differences in incomes, such as when a state offers higher amenity in return for lower income.

The second step is in four parts corresponding to the different policy options. First, reflecting historical Australian policy debates, we estimate the effects on welfare of moving from full equalisation to minimal equalisation. Second, we estimate the welfare effects of moving from full equalisation to a grants system or the standard state system, which both provide donor relief. All of these alternatives are found to be inferior to full equalisation.

Third, inspired by the theoretical analysis, we estimate the (inevitable) gain in welfare from moving from the previous Australian scheme of full equalisation to efficient equalisation. Fourth, as a second-best policy, we estimate the best rate of partial equalisation, which turns out to be 70 per cent. This policy of 70 per cent of full equalisation generates a significant welfare gain, although not as large as under efficient equalisation.

The remainder of this paper is structured as follows.

Section 2 contains the theoretical analysis. That is, it develops a model of fiscal equalisation and uses that model to derive an efficient fiscal equalisation formula. The model synthesises Boadway and Flatters (1982) with Albouy (2012), adds the Australian-oriented enhancements and the additional types of government transfers introduced above, and offers fresh insights on efficient fiscal equalisation. This section provides a general explanation of the model and formula, while the full theoretical analysis is presented in the Appendix.

The remaining sections contain the applied analysis.

Section 3 summarises the previous Australian system of full fiscal equalisation, which was managed by the Commonwealth Grants Commission (CGC). It identifies the similarities and differences between the Australian system and the efficient system. These differences are quantified using the CGC equalisation assessment for 2026/27.

Section 4 shows how limited equalisation could be implemented for residence-based taxes and how this differs from full equalisation. This limits equalisation to the effects from state population composition.

Section 5 estimates the impacts of equalisation policies on consumer welfare and the state distribution of the national population. The previous policy of full equalisation is used as a baseline or reference point. First, we estimate the loss in welfare from moving from full equalisation to minimal equalisation. Second, we estimate the effects on welfare of moving from full equalisation to the alternatives that provide some donor relief, namely the grants system and the standard state system. Third, we estimate the inevitable gain in welfare from moving from the full equalisation to efficient equalisation. Fourth, we estimate the welfare gain from moving to the second-best policy of 70 per cent of full equalisation.

Section 6 presents the six main qualifications to the analysis. Section 7 summarises the proposal for efficient equalisation as well as the second-best policy of 70 per cent equalisation. It also sets out how both policy proposals can be implemented.

2 EQUALISATION MODEL

This section addresses the first aim of this paper, which is to develop a theoretical model and use it to derive principles for fiscal equalisation that are efficient, comprehensive and practical, with general applicability for federations. First, we explain our model, then the equalisation principles that we derive from it and finally we compare those principles with those obtained in previous studies. The Appendix sets out the full theoretical analysis while here we provide a general explanation of it.

2.1 Model

Our model draws on Boadway and Flatters (1982) and Albouy (2012). While Boadway and Flatters (2012) present a range of models, this paper draws on the final model, which features heterogeneous individuals and capital. Table 1 summarises the main features of the model used here compared to the models of Boadway and Flatters (1982) and Albouy (2012).

As shown in Table 1, our model has much in common with the earlier models while also having some important differences. We begin with the differences, then discuss the common assumptions. This is followed by a general discussion of the implications of the model for government policy.

Differences in Assumptions

Our model extends the earlier models in three ways. These extensions involve distinguishing more categories of government transfers, modelling government expenditure in more detail and introducing a consumption tax.

The first extension is to distinguish three types of government transfers (Table 1), compared to one type of transfer in Albouy (2012). This extension helps resolve the issue of whether and how fiscal equalisation should apply to residence-based taxes.

The first type of transfer is fiscal equalisation transfers. They are modelled as a transfer from the central government budget to the budgets of state governments.

The second type of transfer is the main redistributive transfers between labour types, which are also part of the central government budget. This is represented as a set of net transfers between labour types that sum to zero.

State government budgets also redistribute between labour types. This is because state government services are funded by taxes that rise with income. The amount of this redistribution can vary a little from state to state, which can distort labour location decisions and hamper the achievement of vertical equity.

Table 1: Comparison of Main Assumptions

	Boadway and Flatters (1982)	*Albouy (2012)*	*this paper*
No. of states	2	Any	Any
State Residence-based taxes	labour, property (interest plus rent)	labour, interest, rent	labour, interest, rent, consumption
State Source-based taxes	capital, fixed factor	capital, fixed factor	capital, fixed factor
Central Govt taxes	None	residence-based taxes	None
Central Govt transfers	differentiated by state	differentiated by state by labour type	differentiated by state, differentiated by labour type
State Govt transfers	none	none	differentiated by state by labour type
Labour	heterogeneous	heterogeneous	heterogeneous
Asset holdings (state/national)	national	national	national
Key economic differences between states	Skill-mix of individuals; economic rents	Skill-mix of individuals; economic rents; government productivity; consumer amenity	Skill-mix of individuals; economic rents; government productivity; consumer amenity
State government good	Private; equal provision across individuals	Private/public; equal provision across individuals	Private; provision can vary across individuals; fixed and variable production costs
State government view of equalisation payments	taken as given	taken as given	taken as given
Labour and capital supplies	Fixed nationally; fully mobile between states	Fixed nationally; fully mobile between states	Fixed nationally; fully mobile between states

To correct this problem, the model includes a third type of transfer, redistributive transfers at the state government level. These state transfers eliminate any discrepancies between states in the redistributive effects of their budgets.

After distinguishing these three types of transfers, we can reach a clear conclusion on the efficient form of equalisation for residence-based taxes, as we shall see later in this section.

The second extension is to model government expenditure in more detail. We do this because the literature on fiscal equalisation focusses mainly on state government revenues, whereas the Australian experience demonstrates that equalisation of expenditures is almost as important both at a theoretical and empirical level. To better model equalisation of expenditures, we generalise the earlier models by allowing usage for government services to vary between types of individuals and to allow for both fixed and variable costs in producing those services (Table 1).

The third extension is to introduce a consumption tax. Consumption taxes play an important role in some federations. In Australia, a Goods and Services Tax (GST) is collected by the central government and the revenue is then distributed between the states in a way designed to both implement fiscal equalisation and reduce vertical fiscal imbalance between the central and state governments.

We now turn to the simplifying assumptions we have made compared to Albouy (2012). The two simplifications that are of most relevance for fiscal equalisation can be seen in Table 1. First, while Albouy (2012) includes residence-based taxes in the budgets of both central and state governments, in our model they are only included in the budgets of state governments. Second, in Albouy (2012) state government services can be private or public in nature, while in our model they are only private. The reasons for these two simplifications are as follows.

Albouy (2012) shows that it is inefficient for the central government to levy residence-based taxes if states vary in their level of amenity. This is because an individual of a given type can partly avoid the central government tax by choosing to live in a state where they receive a lower wage in return for higher amenity.

We avoid this inefficiency by abstracting from residence-based taxes at the level of the central government. This simplifies the efficient fiscal equalisation rule. Simplifying the budget of the central government in this way is also consistent with the traditional focus of the fiscal equalisation literature on state government budgets. We return to this simplification in section 2.3.

Boadway and Flatters (1982) and Albouy (2012) point out that, to the extent that state government services are public goods, the per capita cost of providing those services declines with a state's population, introducing a positive externality from state population size. However, from the literature, both Boadway and Flatters (1982) and Albouy (2012) assess that

state government services are private to a close approximation. This also seems to be the case in Australia where major state government services include school education and hospital care, whereas services that are more public in nature such as defence and foreign relations are provided by the central government.

Against that background, we make the assumption that state government services are private in nature. This simplifies the fiscal equalisation formula by removing the need to allow for a small positive state population externality of uncertain size. This approach also has the modelling advantage that migration to a higher wage state helps achieve locational equilibrium through diminishing returns in the presence of a fixed factor, without any offset from increasing returns in government services via public goods. We return to this simplification in section 2.3.

Common Assumptions

We now turn to the many commonalities between our model and the two earlier models that can be seen in Table 1. We discuss in turn the markets for capital and labour, the economic differences between states and the different types of source-based and residence-based taxes.

In modelling the capital and labour markets, it is assumed that factors supplies are fixed at the national level but are fully mobile between states. For Pareto efficiency, these capital and labour supplies need to be efficiently located across states. We analyse these location decisions by considering the capital and labour markets in turn.

In the capital market, the assumption of a fixed national supply of capital would be odd in a study of corporate tax, especially for an open economy. However, it is a more innocuous assumption in the regional economics setting of fiscal equalisation. For the fixed national supply of capital to be efficiently located, the marginal product of capital must be uniform across states. This will be the case in equilibrium only if the user cost of capital is also uniform.

On the supply side of the capital market, capital owners will arbitrage between states until they receive the same post-tax rate of return in each state. For this to translate into a uniform user cost of capital after corporate tax is added, each state must apply corporate tax at the same rate.

It follows that capital can only be located efficiently if the rate of corporate tax is the same in each state. This uniformity condition holds in Australia because only the central government can impose corporate tax. However, in some other federations, including the USA, Canada, Germany and Switzerland, both national and subnational governments can impose corporate tax. Thus, Boadway and Flatters (1982, p. 625-627) propose ‘a scheme of capital tax harmonisation’ for Canada so that capital can be efficiently located. In passing, we note that the efficiency need for such a harmonisation scheme calls into question the wisdom of providing subnational governments with a corporate taxing power.

In any case, in our model we abstract from this problem by assuming that the rate of corporate tax is uniform across states. This simplifying assumption means that capital can be efficiently located across states, making a Pareto optimum possible.

Turning to the labour market, labour is heterogeneous (Table 1). The supply of each type of labour is fixed at the national level but is fully mobile between states. In our applied analysis in section 4, labour types are distinguished using a cross-classification by age, educational attainment and indigeneity status.

This structure of the labour market suggests three policy objectives. Those objectives are vertical equity between different types of labour, horizontal equity in the treatment of the same type of labour in different states and efficiency in how each type of labour is located across states. We examine each of these objectives in turn.

Vertical equity between labour types is directly achieved by redistribution policies, especially central government redistributive transfers. State governments also redistribute through their pattern of spending and taxation and, in our model, through their own redistributive transfers, as discussed above.

Turning to horizontal equity, under full mobility of labour, a given labour type will migrate between states until its welfare level is equalised across states. In this way, migration ensures that there is full horizontal equity for each labour type. This removes horizontal equity as a motive for fiscal equalisation in the three models in Table 1.

While labour mobility ensures, for a given labour type, that welfare is uniform across states, more uniformity than that is required for labour to be efficiently located across states. Specifically, for each labour type, non-labour incomes also need to be uniform across states, so they do not distort labour location choices.

One of the components of non-labour income that needs to be uniform across states for a given type of labour to be located efficiently is nominal net fiscal benefits. Some states may have a higher fiscal capacity in the sense of being able to offer higher net fiscal benefits. In this theoretical framework, the role of fiscal equalisation is to equalise fiscal capacities so that each state can afford to offer the same type of labour the same nominal net fiscal benefit. This supports efficient labour location, making Pareto efficiency possible.

To model fiscal equalisation, we need to model the main economic differences between states that give rise to differences in fiscal capacities. As seen in Table 1, we follow Albouy (2012) in the economic differences between states that we model.

First, states can vary in their amenity to consumers. A state with higher amenity attracts more labour, until the benefit of the higher amenity is balanced by the cost of lower wages. Thus, in

labour market equilibrium, there may be higher amenity-lower wage states, and lower amenity-higher wage states for a given labour type.

Second, states can vary in their underlying productivity. State differences in productivity can arise from factors such as remoteness or inefficient delivery of government services. Higher productivity states can attract more labour with a lower cost of living (defined broadly to include now only lower prices but also lower residence-based taxes), until the benefit of a lower cost of living is balanced by the cost of lower wages. Thus, there may be higher wage-higher cost of living states, and lower wage-lower cost of living states.

Third, states can vary in their natural endowments, leading to different levels of economic rents from fixed factors of production such as land and mineral resources. This means that some states may have a higher capacity to raise revenue from source-based taxes on economic rents. In Australia, the biggest example of this is the iron ore royalties received by the Western Australian government. To the extent that this extra revenue is collected from non-residents, it can be used to fund higher net fiscal benefits for residents. Unless neutralised by fiscal equalisation, inefficient interstate migration may result.

All three state economic differences – amenity, productivity and natural endowments – can influence labour location decisions both directly and indirectly via state budgets. Further, these influences may be different for different types of labour. Hence, states may differ in a fourth way, namely in their mix of labour types or population composition, as indicated in Table 1.

We now turn to the type of taxes identified in the modelling framework. The three models all take into account the same core set of state taxes. In fiscal equalisation modelling, these taxes are usually divided into source-based and residence-based taxes.

The source-based taxes are on capital and the fixed factor (Table 1). For the source-based tax on capital (corporate tax), we have already noted that it needs to be levied at the same rate in each state for locational efficiency of capital.

Examples of source-based taxes on the fixed factor include taxes on economic rents from land and minerals. The issue of locational efficiency does not arise for the fixed factor because, by definition, it is immobile between states. However, source-based taxes on economic rents are partly paid by non-residents, which allows a state with higher economic rents to offer higher net fiscal benefits to its residents. Unless neutralised by fiscal equalisation transfers, this higher fiscal capacity may induce inefficient interstate migration.

In all three models there are residence-based taxes on labour and property income. State income tax (which is not applied in Australia) and state payroll tax fall into this category. Residence-based taxes can be thought of as a user pays charge on residents for state government services. Such user pays charging is potentially efficient. However, states with more skilled workers can raise more revenue from residence-based taxes on a per capita basis, allowing

them to offer all workers higher net fiscal benefits than in other states. Again, this higher fiscal capacity needs to be neutralised by fiscal equalisation for an efficient national labour market.

Albouy (2012) extended Boadway and Flatters (1982) by separating residence-based taxes on property income into taxes on interest (i.e. income from capital) and taxes on economic rent (i.e. income from fixed factors). As noted previously, we also include a consumption tax, like the Australian GST, as an additional residence-based tax.

The model and government policy

Having settled on the assumptions of the model, we can consider the implications for government policy, especially for the principles of fiscal equalisation.

In the formal derivation of the fiscal equalisation formula in our Appendix, government policy decisions are assumed to be made by a benevolent planner. This planner chooses a Pareto efficient outcome, while maintaining vertical equity. This results in the following policies.

First, the planner ensures that, in each state, government services are provided to the different types of consumers at efficient levels. This is the level at which, for each type of labour in each state, the marginal rate of substitution between the government service and the consumption good is equal to their marginal rate of transformation in production. This is shown explicitly in Albouy (2012). In our Appendix, the choice of an efficient level of government spending is implicit in our use of an indirect utility function involving the prices of the consumption and government goods.

Second, as noted previously, the planner ensures locational efficiency of capital by applying the same rate of source-based tax on capital (i.e. corporate tax) in each state.

The planner also follows the three policies described earlier for a heterogeneous labour market. Vertical equity between labour types is maintained using the redistribution policies that were discussed. Horizontal equity for a given labour type across states is achieved through free interstate migration.

Finally, with all of those other policies in place, locational efficiency for labour is supported through fiscal equalisation transfers. These equalisation transfers are set to ensure that each state government can afford to offer the same type of labour the same nominal net fiscal benefit.

In the model, this requirement for the pattern of nominal net fiscal benefits is part of a broader requirement for locational efficiency of labour that refers to the pattern of non-labour income. Each state offers the same type of labour the same nominal non-labour income so that state differences in non-labour incomes do not distort labour locational choices.

Besides nominal net fiscal benefits, there are two other categories of non-labour income to be considered. The second category of non-labour income is the central government transfers

(positive and negative) designed to achieve vertical equity. These transfers are assumed to vary only according to labour type, not according to state, and so they satisfy the requirement of being uniform across states for each labour type.

The third category of non-labour income is property income. In the model, individuals of a given labour type are assumed to own the same portfolio of national assets, irrespective of their state of residence. As a result, property income for a given labour type is also uniform across states.

Thus, in the model, fiscal equalisation can achieve labour locational efficiency. It can be used in aligning nominal net fiscal benefits across states, while in the model the other two components of non-labour income are already aligned across states. That is, a given type of labour receives the same central government transfer, the same property income, and the same nominal net fiscal benefit, irrespective of their state of residence.

Our national assumption on asset ownership follows some previous literature, including Albouy (2012) and the final model of Boadway and Flatters (1982). However, there is also a literature that instead assumes that individuals only hold assets that are located in their state of residence. For example, this is assumed in one of earlier models considered by Boadway and Flatters (1982). In that case, property income can vary by state of residence for a given labour type. However, it is questionable whether this would affect labour location decisions in practice. This is because an individual's total wealth does not change merely as a result of moving from one state to another, even though they may change the composition of their portfolio. So, to remove this doubtful influence on location decisions, this study assumes that individuals own a share of national assets. As a result, property income does not influence their location decisions.

In the model, there are three main reasons that some states will be able to offer higher net fiscal benefits than other states if there is no fiscal equalisation. First, states with larger populations are able to spread the fixed costs of their government administrations more thinly across their populations. Second, states richer in land and minerals are likely to have a fiscal advantage in raising revenue from source-based taxes. Such taxes can be used to fund services to the residents of a state, but are partly collected from non-residents. Third, states with higher-skilled labour more heavily represented in their populations are likely to raise more revenue per capita from residence-based taxes, leaving them better funded to provide services to all labour types.

In each of these cases of fiscal advantage, the advantaged state is able to offer labour of a given type a higher net fiscal benefit. This can take the form of higher government services and/or low tax rates for residence-based taxes. This will lead to interstate migration driven inefficiently by state differences in nominal net fiscal benefits, rather than driven efficiently by labour market conditions in each state. However, equalisation transfers can be used to remove this locational inefficiency, as originally emphasised by Buchanan (1952).

2.2 Efficient Fiscal Equalisation Formula

We now present and discuss the formula for efficient fiscal equalisation derived in the Appendix.

In this discussion, we sometimes refer to the Australian system of full fiscal equalisation. By that we mean the system of full equalisation that was in place until the 2020/21 financial year. While Australia completed a transition to standard state equalisation in 2026/27, that new system still involves calculating transfers under full equalisation as a first step. The additional steps under standard state equalisation are explained and assessed in section 5.3.

Fiscal Equalisation Formula

The Appendix formally derives the efficient fiscal equalisation formula. The formula is obtained as equations [29] and [30] of the Appendix, which are reproduced below for ease of reference.

Under this formula, each state is funded to offer the same labour type *e* the same net nominal fiscal benefit, nfb_e, as required for efficient labour location. Recall that the net fiscal benefit is equal to the nominal value of state government services received net of the value of the state residence-based taxes that are paid, as reflected in equation [30].

$$fe^j = GF\left[PG^j/N^j - \sum_j PG^j/N\right] - \left[tL^j r^j L^j/N^j - \sum_j tL^j r^j L^j/N\right] - \left[tK\, i^j K^j/N^j - \sum_j tK\, i^j K^j/N\right] + \sum_e \left(N_e^j/N^j - N_e/N\right)\overline{nfb}_e \quad [29]$$

$$\overline{nfb}_e = \frac{1}{N^e}\left\{\begin{array}{c} \sum_j PG^j N_e^j g_e^j - \sum_j tc^j PC^j N_e^j c_e^j - \sum_j tw^j N_e^j w_e^j \\ -\theta_e \sum_j \frac{N_e^j\, tI^j}{N^e} \sum_k (1 - tK)\, i^k K^k - \theta_e \sum_j \frac{N_e^j\, tR^j}{N^e} \sum_k (1 - tL^k)\, r^k L^k \end{array}\right\} \quad [30]$$

Equation [29] shows the efficient fiscal equalisation transfer per capita to state *j*, which is fe^j. The right-hand side of equation [29] sorts the components of the state budget into those that should be fully equalised and those that should be subject to limited equalisation based on population composition. The first three terms involve full equalisation and are now considered in turn.

The first term implies that the fixed costs of each state government should be fully equalised. A state government receives from the equalisation pool its state fixed costs and pays into the pool its population share of the fixed costs for all states. In that way, each state pays the same on a per capita basis to fund the fixed costs of all state governments. This removes the fiscal advantage that larger states enjoy over smaller states from spreading fixed costs over a larger population base. It is efficient to equalise for the fixed costs because labour location decisions should be based on marginal costs, not fixed costs. In Australia, there is full equalisation for the fixed costs of government in what is known as equalisation for administrative scale.

Spahn (2007, p. 90) questions equalisation of fixed costs. He states: "the question remains whether the equalization scheme should reward small jurisdictions for defending the status quo when there are economic and political reasons for merging jurisdictions".

Spahn's (2007) argument does not seem convincing. In Australia's case, the borders of the eight states and territories have remained essentially unchanged for a long time, since 1911. So, it seems important to take those borders into account in designing an efficient equalisation policy. Further, the existing equalisation approach rewards all states in the event of a state merger. The saving in fixed costs from mergers is shared among all states on an equal per capita basis.

The second and third terms imply that source-based taxes on productive assets such as land or natural resources (L) and capital (K) should also be fully equalised. In the model, individuals own shares of national assets, so the ability to tax asset income at its source enables a state government to tax asset holders nationwide. For example, mining royalties allow a state government to tax shareholders in all states (and, in practice, internationally). Because of this national incidence, it is efficient to share the proceeds nationally. To do otherwise creates fiscal advantages for states with more ready access to source-based tax revenue, leading to inefficient fiscally-induced migration. In Australia, the main state source-based taxes are fully equalised. This includes full equalisation of mining royalties, stamp duty on conveyances and land tax.

The final term involves only limited equalisation of the nominal net fiscal benefit (nfb_e). This limited equalisation only takes into consideration state differences in fiscal capacity that arise from state differences in population compositions. When the share of a labour type in a state population (N_e^j/N^j) is higher than in the national population (N_e/N), the state receives a higher transfer. This is to cover the additional cost of providing the national net fiscal benefit for that labour type to its excess population of that labour type. By the same token, in cases where the state share of a labour type is below the national share of that type, the state receives a lower transfer to reflect its saving in net fiscal benefit.

This limited equalisation eliminates inefficient migration driven by fiscal advantages and disadvantages arising from differences between states in their population compositions. Limited equalisation does not equalise for factors other than population composition, including state amenity and state productivity, for reasons discussed below.

The proposition that limited equalisation rather than full equalisation should be applied to the net fiscal benefit, as defined in equation [30], is important for fiscal equalisation. This is because the net fiscal benefit accounts for a large part of state government budgets. The net fiscal benefit covers all of government spending other than the fixed costs and takes into account all residence-based taxes.

It may appear from equation [29] that, when limited rather than full equalisation is used, the net fiscal benefit would be equalised as a single category. In practice, we apply limited

equalisation separately to expenditures and residence-based taxes because they are driven by different demographic factors.

Under limited equalisation, residence-based taxes can be equalised as a single category. Personal income, as defined in the Census, is used as the tax base. We limit equalisation to the effects of population composition by predicting the personal income of each state by applying its population composition to the personal income of each labour type at the national level. Labour types are constructed by cross-classifying the population by age, educational attainment and indigeneity. The full details are set out in section 4.

This limited equalisation of residence-based taxes as a single category is simpler than the current Australian equalisation approach. That approach deals separately with the GST, payroll tax, motor vehicle taxes, gambling taxes and insurance taxes, as shown in section 3. Further, some other federations also need to deal with state income taxes in their equalisation procedures. Thus, a change from full to limited equalisation of residence-based taxes would make the fiscal equalisation system both efficient and simpler.

On the expenditure side of state budgets, the CGC already undertakes an extensive analysis of the effects of state population composition on the usage of different government services. To apply limited equalisation rather than full equalisation, we adopt that CGC analysis of the effects of population composition. However, we do not use the CGC analysis of other factors that affect government expenditures in different states, such as cost differences, because it is inefficient to equalise for those other factors. The full details are in section 3.

The Appendix shows mathematically that limited equalisation of nominal net fiscal benefits is efficient. That is, it is efficient to equalise for the effects of population composition but not for other factors that affect nominal net fiscal benefits such as state amenity or government costs. The economic intuition for this is as follows.

Labour market efficiency requires that a given type of labour is offered the same nominal net fiscal benefit by each state, so that net fiscal benefits do not distort labour location decisions. A state with relatively few skilled workers will have lower income and tax revenue and hence will not have the fiscal capacity to offer the same net fiscal benefits as other states. However, this fiscal disadvantage from state population composition is corrected under the fiscal equalisation transfer given by equations [29] and [30].

States can also differ in their amenity. Interstate migration is likely to occur from lower amenity states to higher amenity states until the gain in consumer welfare from higher amenity is offset by a loss in consumer welfare from lower income due to diminishing returns to labour. This results in labour locational efficiency.

At the same time, the higher amenity state is left with a fiscal disadvantage because its lower income leads to lower tax bases. However, it is inefficient to equalise for this fiscal disadvantage because residents have freely chosen lower income in return for higher amenity.

Full equalisation would subsidise living in higher amenity states leading to higher amenity states having inefficiently higher populations relative to lower amenity states.

The argument against equalising for state differences in government productivity is similar. Lower productivity in providing government services due to lower population density or other factors such as an inefficient state government makes government services more costly. This is likely to lead to higher residence-based taxes, consistent with the user pays principle. Outward interstate migration is likely to occur until those higher taxes are offset by higher wages.

At the same time, the higher cost of government services leaves the lower productivity state with a fiscal disadvantage, likely reflected in higher residence-based taxes. However, it is inefficient to equalise for this fiscal disadvantage because that would remove the price signal from higher residence-based taxes of higher government costs. Full equalisation would subside living in higher cost states, leading to higher cost states having inefficiently higher populations relative to lower cost states.

Redistribution by State Governments

As noted above, the fiscal equalisation formula of equations [29] and [30] funds each state to offer the same labour type the same nominal net fiscal benefit, as required for efficient labour location. However, whether an individual state uses its equalisation funding to follow the national pattern of how net fiscal benefits are distributed across labour types or some other pattern depends on the progressivity of its budget.

Boadway and Flatters (1982) explain the reason that provincial budgets are progressive in their model.

> Residence-based taxes in each province are proportional to each individual's income, while public services, assumed to be of a quasi-private nature, are distributed on an equal per capita basis. The net effect of the provincial fiscal structures is therefore progressive.

That is, state government budgets are progressive because state government services are funded with residence-based taxes that rise with income rather than on a user pays basis. This is also true in Australia and is consistent with the models used in Albouy (2012) and here. However, the degree of progressivity of budgets may vary between the different states in a federation.

One reason for this variation is that the cost of government services may vary from state to state. In lower cost states, government spending can be funded with lower rates of residence-based taxes, making the state budget less progressive than in higher cost states. Hence there may less variation in the pattern of net fiscal benefits across labour types in lower cost states. Yet for labour location efficiency, we need the pattern of net fiscal benefits across labour types to be the same in every state.

In the Appendix, the benevolent planner solves this problem using the state redistributive transfers, *str*, given by equation [31], which is reproduced below.

$$str_e^j = \overline{nfb}_e - \left\{ PG^j g_e^j - tc^j PC^j c_e^j - tw^j w_e^j - tI^j \frac{\theta_e}{N_e} \sum_j (1 - tK)\, i^j K^j - tR^j \frac{\theta_e}{N_e} \sum_j \left(1 - tL^j\right) r^j L^j \right\} \quad [31]$$

In each state budget, transfers are made to each labour type to bridge the gap between the national nominal net fiscal benefit for that type, nfb_e, and the benefit implied by the state budget, which is given by the term in curly brackets. After taking these state redistributive transfers into account, each state offers the same type of labour the same nominal net fiscal benefit. This supports locational labour efficiency.

These state redistributive transfers only play the fine tuning role of synchronising the progressivity of state budgets. They do not change the overall progressivity of state budgets when viewed from a national level, as seen in equation [32].

$$str_e = \sum_j N_e^j str_e^j = 0 \quad [32]$$

Further, state redistributive transfers have a zero net cost to each state budget, as is seen in equation [19] from the Appendix, which is also reproduced below. This is because the fiscal equalisation transfers, fe^j, mean that each state is funded to offer the same labour type the same nominal net fiscal benefit.

$$str^j = \sum_e N_e^j str_e^j = 0 \quad [19]$$

2.3 Relationship to previous studies

While there is general agreement in the literature that source-based taxes should be fully equalised, opinion is divided on whether residence-based taxes should be equalised.

Buchanan (1952) and Boadway and Flatters (1982) find that residence-based taxes should be fully equalised. Albouy (2012) finds that they should not be equalised. Rather than supporting either of those polar positions, this paper finds that residence-based taxes should be equalised, but only for the effects of population composition.

Buchanan (1952) and Boadway and Flatters (1982) assume that states differ in their population composition but not in some other ways such as amenity or government costs. Hence, they find in favour of full equalisation because it is efficient to equalise residence-based taxes for the effects of population composition. Had they also considered differences between states in productivity or consumer amenity and applied the same theoretical approach, they logically would have found in favour of the limited equalisation of residence-based taxes proposed here, based on population composition only.

This analysis is also consistent with the model used by Albouy (2012). This may appear surprising given Albouy's conclusion: "unlike influential work by Buchanan (1950) and Boadway and Flatters (1982), I argue that, when properly interpreted, this same framework actually only supports the equalisation of source, and not residence-based revenues".

In fact, Albouy's (2012) model, properly interpreted, does imply that it is efficient to apply limited equalisation to residence-based taxes. However, for this to be evident, we need to disaggregate one of the terms in his key equation, as we do below.

Albouy (2012) models one type of government transfer. This transfer is made by the central government to individuals and it can vary by both labour type and state. This transfer is used to represent both redistributive and fiscal equalisation transfers. In reality, fiscal equalisation transfers are separate and are paid to state governments rather than individuals, as Albouy (2012) acknowledges. We return to that point below.

Albouy's (2012) key result is his equation [8], which is reproduced here.

$$\bar{F}^{j*} = \tau_w^F \left(\overline{w}^j - \overline{w}^{j,F}\right) - \frac{\tau_L^j \, r^j \, L^j + \tau_K^j \, i^j \, K^j}{N^j} + (1-\alpha) \, \frac{p_G^j \, G^j}{N^j} + \frac{\sum_e N_e^j \, F_e}{N^j} \qquad \text{[A8]}$$

This equation shows the efficient level of central government transfers paid to residents of state j, expressed in per capita form. It contains four terms and logically follows from the modelling assumptions.

The first term refers to a central government tax on labour income. It addresses the inefficiency that arises from labour of given type avoiding this tax by locating in a state that offers higher amenity in return for a lower wage. The first term eliminates this inefficiency with a transfer that, in effect, adjusts the tax paid to be based on the national (rather than state) wage for a labour type.

As explained in section 2.1, one of the simplifications in our model compared to Albouy (2012) is that we do not include any residence-based taxes in the budget of the central government. This removes the first term.

The second term refers to state government taxes on source-based income. It addresses the inefficiency that arises when a state government has an advantage in collecting revenue nationwide using source-based taxes to fund local services. This inefficiency results in higher net fiscal benefits to local residents, artificially attracting labour to that state, as discussed above.

The effect of the second term is that the central government claws back all of the revenue that state governments raise from source-based taxes. A more direct way of achieving the same outcome would be to re-assign the taxation power for source-based taxes to the central government.

The third term refers to the share of state government expenditure that is devoted to goods that are public rather than private in nature. It reimburses state governments for the cost of providing those public goods. Otherwise, the higher per capita cost of public goods in states with smaller populations would lead to higher residence-based taxes (or lower services), artificially discouraging inward migration. This is somewhat similar to our argument that the fixed costs of state government should be equalised.

As explained in section 2.1, one of the simplifications in our model compared to Albouy (2012) is that we assume state government services are private goods. This removes the third term.

The fourth term represents redistribution between labour types. Albouy (2012, p. 827) states that it "accomplishes redistributive goals federally".

Thus, Albouy's equation for efficient central government transfers to a state does not explicitly mention state government residence-based taxes. This leads Albouy to find that residence-based taxes should not be equalised.

Before analysing that finding, we apply our two modelling simplifications mentioned above, reducing the number of terms in Albouy's formula from four to two.

$$\bar{F}^{j*} = -\frac{\tau_L^j r^j L^j + \tau_K^j i^j K^j}{N^j} + \frac{\sum_e N_e^j F_e}{N^j} \qquad \text{[A8]'}$$

In discussing these two terms, Albouy (2012) associates the first term with fiscal equalisation transfers and the second term with redistribution transfers, yet his model only distinguishes one type of transfer.

We use our model to clarify the interpretation of Albouy's equation [8]. We isolate the role of fiscal equalisation transfers in the equation to determine whether the equation implies any equalisation of residence-based taxes.

Our model includes three types of transfers, as explained earlier. The central government makes fiscal equalisation transfers to state governments, *fe*. It also makes redistributive transfer to different types of labour, *tr*. State government makes transfer by labour type within their own states, *str*, but only to the extent necessary after allowing for the two types of central government transfers.

To directly compare our results with Albouy's (2012) equation [8], we add our three types of transfers together, aggregate them to the state in which they are received and then express them on a per capita basis.

$$\bar{F}^{j*} = fe^j + \sum_e N_e^j / N^j \, tr_e + str^j / N^j \qquad \text{[33]}$$

When summed to the state level, the state redistributive transfers equal zero, as shown in equation [19], thus eliminating the final term. We then substitute in the fiscal equalisation transfer, *fe*, given by equation [29] to obtain the following.

$$\bar{F}^{j*} = GF\left[PG^j/N^j - \sum_j PG^j/N\right] - \left[tL^j r^j L^j/N^j - \sum_j tL^j r^j L^j/N\right] - \left[tK\, i^j K^j/N^j - \sum_j tK\, i^j K^j/N\right] + \sum_e \left(N_e^j/N^j - N_e/N\right)\overline{nfb}_e + \sum_e N_e^j/N^j\, tr_e \quad [34]$$

Next, we take the state government budget constraint expressed at a national level, which is equation [28] from the Appendix. It is reproduced below for ease of reference.

$$\sum_e (N_e/N)\,\overline{nfb}_e + GF \sum_j PG^j/N = \sum_j tL^j r^j L^j/N + \sum_j tK\, i^j K^j/N \quad [28]$$

Notice that the state budget constraint of equation [28] is fully contained within equation [34], so it cancels out there. This leaves the following equation, which we have reformatted to follow Albouy's style (2012) for ease of comparison.

$$\bar{F}^{j*} = \frac{PG^j GF - tL^j\, r^j\, L^j - tK\, i^j\, K^j}{N^j} + \frac{\sum_e N_e^j (\overline{nfb}_e + tr_e)}{N^j} \quad [35]$$

We can now directly compare this equation based on our model, with equation [A8]' based on Albouy (2012), which is repeated below to make the comparison easier.

$$\bar{F}^{j*} = \frac{-\tau_L^j\, r^j\, L^j - \tau_K^j\, i^j\, K^j}{N^j} + \frac{\sum_e N_e^j\, F_e}{N^j} \quad [A8]'$$

Apart from obvious small differences in notation, we see that the two versions of the formula for the efficient level of per capita transfers to a given state are very similar.

In the first term in both equations, the central government claws back all of the revenue that state governments raise from source-based taxes. In the case of our model, the central government also refunds the fixed costs of state governments, whereas in Albouy (2012) state governments do not have fixed costs.

Comparing the second terms of both equations, we see that they are identical once we interpret *F* in Albouy's (2012) key equation as follows.

$$F_e = \overline{nfb}_e + tr_e = 0 \quad [36]$$

Using this disaggregation of *F*, we can expand Albouy's equation so that it contains three terms.

$$\bar{F}^{j*} = \frac{-\tau_L^j\, r^j\, L^j - \tau_K^j\, i^j\, K^j}{N^j} + \frac{\sum_e N_e^j\, \overline{nfb}_e}{N^j} + \frac{\sum_e N_e^j\, tr_e}{N^j} \quad [37]$$

The first two terms cover fiscal equalisation. The first term refers to full equalisation of source-based taxes. The second term refers to limited equalisation of net fiscal benefits, *nfb*, for the

effects of population composition. This follows the same principles as our fiscal equalisation formula.

Thus, properly interpreted, Albouy's (2012) model implies that it is efficient to apply limited equalisation to the net fiscal benefit. This means equalising residence-based taxes, but only for the effects of population composition. It also means equalising government spending in the same way.

The third term is standard redistribution through central government transfers to individuals. Albouy (2012) overlooked the needed to equalise the net fiscal benefit for population composition because he did not divide F into ηfb and tr, as in equation [36], but rather interpreted F as if it were tr.

Besides clarifying the boundary between fiscal equalisation and redistributive transfers, equation [36] is also important in designing policies for vertical redistribution. The total amount of vertical redistribution is captured in Albouy's F_e. Thus, in designing redistributive policies, the central government should decide on its own transfers, tr_e, after taking into account the amount of vertical redistribution already achieved in state government budgets, ηfb_e.

The net fiscal benefit, ηfb, reflects both spending on government services and residence-based taxes. Hence, our modelling shows that both spending on government services and revenue from residence-based taxes components should be equalised for the effects of population composition. This is fully consistent with the models in the two previous studies.

Boadway and Flatters (1982) find in favour of full equalisation of residence-based taxes, but only because population composition is the only factor that they consider. They do not consider equalisation of government services, but only because they, like Albouy (2012) assume that government services are provided at the same level to everyone, so population composition has no effect on usage.

In practice, the Australian experience with equalisation shows important differences in the expenditure needs of different population groups. For example, the indigenous population has high government expenditure needs and is highly represented in the Northern Territory.

More generally, in section 4 we show full equalisation of government spending in Australia has large effects on equalisation transfers. However, this paper only finds in favour of equalisation of government spending for fixed costs and the effects of population composition. Australia goes further by also equalising for differences in costs of government services. This step away from pricing state government services through the state tax system reduces efficiency.

To conclude, all three studies, properly interpreted, are consistent with the proposition that the nominal net fiscal benefit should be equalised for the effects of population composition, but not for other factors.

3 FULL AND EFFICIENT FISCAL EQUALISATION SYSTEMS

Having developed a formula for efficient fiscal equalisation in section 2, the remaining sections of this paper apply it to Australia and estimate the effect on consumer welfare and state populations.

This section summarises the previous Australian system of full fiscal equalisation and quantifies it using the Commonwealth Grants Commission (CGC) equalisation assessment for 2026/27. It then shows how this CGC assessment would change under efficient equalisation.

From 1981/82 until 2020/21, the Australian equalisation system was unusually comprehensive in two ways. First, equalisation was applied not only to state government revenues but also to state government expenditures. Second, these revenues and expenditures were fully equalised.

From 2021/22 to 2026/27, Australia transitioned to standard state equalisation. However, under standard state equalisation, all of the calculations needed under a full equalisation system still need to be made. Table 3A summarises the calculations of full equalisation transfers for the 2026/27 application year.

Once the calculations for full equalisation have been made, an adjustment is then made to implement standard state equalisation. The standard state is either NSW or Victoria, whichever has the higher assessed fiscal capacity. No state can be assessed to have a higher fiscal capacity than the standard state. Compared to full equalisation, standard state equalisation benefits Western Australia as the state with the highest assessed fiscal capacity.

In this section we proceed as if full equalisation were still in place. The effects of the move from full equalisation to standard state equalisation are assessed in section 5.3.

The method of delivering equalisation transfers varies between countries. In Australia it involves adjustments to the general purpose grants that states receive from the pool of GST revenue. The initial division of the GST pool is according to each state's share of the national population. Equalisation transfers are then made to arrive at a new division of the GST pool. Under full equalisation, the aim of the transfers is to leave each state with the same assessed capacity to provide government services for the same revenue raising effort.

This section analyses the general factors used by the CGC in making its calculations for full equalisation against the efficient equalisation approach developed in section 2. It then examines in greater detail the CGC's latest calculations, which refer to the state distribution of GST revenue in 2026/27, and how this would change under the efficient approach.

3.1 General approach

The general equalisation principle that was used by the CGC (2015) under full equalisation was as follows.

> State governments should receive funding from the pool of goods and services tax such that, after allowing for material factors affecting revenues and expenditures, each would have the fiscal capacity to provide services and the associated infrastructure at the same standard, if each made the same effort to raise revenue from its own sources and operated at the same level of efficiency.

This is similar to the original equity-based equalisation principle advocated by Buchanan (1950) to "allow state units originally unequal in fiscal capacity to provide equal services at equal rates of taxation".

This is consistent with the historical view of governments in Australia that the role of fiscal equalisation is to achieve horizontal equity. One aim of this paper is to examine the benefits to the community of a change in policy to an efficiency-based approach to equalisation.

The CGC (2015) lists the broad range of factors it uses in assessing fiscal capacity.

> The fiscal positions of the States differ because of differences in their natural endowments, their economic, demographic and geographic circumstances and the policy choices they make. The Commission calculates what the fiscal capacities of the States would be if the policy differences were removed. We call these the assessed fiscal capacities of States and they are central to our recommended GST distribution. This distribution is designed to equalise the assessed fiscal capacities of the States.

Thus, the full equalisation transfers between states calculated by the CGC are driven by four factors:

- natural endowments;
- demographic circumstances;
- geographic circumstances; and
- economic circumstances.

These four factors are now considered in turn against the efficiency-based approach to equalisation developed in section 2.

Natural endowments

Higher natural endowments of minerals and prime land provide a state with a fiscal advantage in collecting mining royalties, land tax and conveyancing duties, which can be seen as source-based taxes. Thus, the analysis set out in section 2 implies they should be fully equalised. This promotes efficiency by eliminating fiscally-induced migration caused by differences in state capacities to raise source-based taxes from the national population.

Mining royalties are currently the largest driver of full equalisation transfers in Australia. In fully equalising for the capacity to raise mining royalties, there are two design considerations. First, to the extent practical, equalisation should be based on mining capacity rather than

mining production. In practice, equalisation is based on mining production and it has been argued that some states are more willing than other states to exploit their mining capacity. Second, to the extent that state government revenue raising from mining royalties involves expenditure costs such as costs incurred in project approval processes, those costs should be offset against the revenue gains.

Demographic circumstances

As originally argued by Buchanan (1950), demographic circumstances can significantly affect a state's fiscal capacity. If a relatively high proportion of a state's population is indigenous, not of working age or has low educational attainment, revenue-raising capacity will be lower and expenditure needs higher. Fully equalising for this fiscal disadvantage can be expected to promote efficiency, as established in section 2. It promotes efficiency by eliminating fiscally-induced migration caused by state differences in population compositions.

Geographic circumstances

Geographic circumstances can also affect a state's fiscal capacity. The CGC equalises for geographic factors, including the higher costs associated with remoteness and large urban centres. Notwithstanding its statement above, in practice the CGC partially equalises, rather than fully equalises, for geographic factors. Boadway (2007) explains the partial equalisation process as follows.

> Rural and urban areas have different levels of health care and roads because it costs more to provide such services in rural areas. Equalisation systems typically do not try to fully equalise differences in costs. One way of dealing with the problem is to take as given differences in levels of public services in different geographic locations and to equalise the costs of providing those services for like areas across regions. This is the approach taken in Australia.

However, as established in section 2, from an efficiency perspective, these higher cost areas should not be subsidised. Rather, the additional costs should be funded on a user pays basis through taxes levied on state residents, not funded nationally through equalisation payments. Thus, the efficiency of the Australian equalisation system would be improved by removing equalisation for geographic circumstances.

Economic circumstances

The CGC also equalises for the effects of economic circumstances on several areas of a state's budget. However, under the efficiency analysis of section 2, these are all areas in which only limited equalisation (i.e. for demographic circumstances) should apply. Thus, for maximum efficiency, full equalisation for economic circumstances should be replaced with narrower equalisation for demographic circumstances. The two main areas of equalisation for economic

circumstances are the CGC assessments for payroll tax revenue and the wage costs of expenditures. These two areas are now considered in turn.

The CGC assesses a state's relative capacity to raise payroll tax revenue from the tax base, which is labour income, with an exemption for the general government sector. However, that non-government labour income is affected by both demographic and economic circumstances. It is efficient to equalise for the contribution of demographic circumstances (i.e. mix of labour types) to payroll tax revenue. However, it is not efficient to equalise payroll tax revenue for differences between states in labour market outcomes for the same labour types. In the model of section 2, such differences arise from differences between states in productivity and consumer amenity. These differences act as a market signal for economic migration in an efficiently operating national labour market.

In this study, we simulate the replacement of equalisation for economic circumstances with the more appropriate and narrower equalisation for demographic circumstances. This narrower equalisation was described as limited equalisation in section 2. Under limited equalisation, the population is classified into different types, which may distinguish personal attributes such as age, educational attainment and indigenous status. A national assessment is then made of the average contribution of members of each type to the relevant tax or spending base. These national average member contributions are then applied to each state's population mix in assessing each state's revenue capacity or expenditure needs.

In this way, the contribution of population composition, but not other economic circumstances, is taken into account in assessing the fiscal advantages and disadvantages of each state. The implementation of this limited equalisation for residence-based taxes is developed in section 4 using data from the 2021 Census, as the data from the 2026 Census is not yet available. Section 4 also explains how this differs from full equalisation.

Turning to the equalisation of expenditures for wage costs, the CGC appropriately seeks to abstract from any influence that state government policies may have on state government wage rates. It does this by basing its assessment on private sector wages in each state. However, if the aim is to promote efficiency, any equalisation for differences in wage costs would be removed, as shown in section 2.

The above analysis is summarised in Table 2. It shows, for each of the four factors, whether the CGC applies full equalisation. It compares this with the efficient approach to equalisation developed in section 2. In addition, under a fully efficient approach, the equalisation process would be widened to cover more taxes as explained below.

Table 2: Equalisation

Factor	CGC	fully-efficient
natural endowments	full	full
demographic circumstances	full	full
geographic circumstances	partial	none
economic circumstances	full	limited
government efficiency	none	none

3.2 2026/27 assessment

In practice, the equalisation process used by the CGC is more complex than it may appear from the four factors listed in Table 2. This is seen in the latest CGC assessment, which relates to the distribution of GST revenue in 2026/27. Table 3A is drawn from the CGC report (2026, p.35) and shows the separate components or drivers that are aggregated to calculate transfers under full equalisation. Those equalisation transfers appear in the final row of the table. By design, these transfers sum to zero when added across states.

Table 3A: Drivers of CGC (full) fiscal equalisation, 2026/27

	NSW	Vic	Qld	WA	SA	Tas	ACT	NT	Redist	category
	$m	$m	$m	$m	$m	$m	$m	$m	$m	
REVENUE RAISING CAPACITY										
Mining production	4 382	8 942	-5 771	-10 726	1 874	600	627	72	16 497	source-based
Taxable land values	-3 632	- 482	1 892	1 004	643	248	218	109	4 114	source-based
Property sales	-2 288	177	333	517	749	307	19	186	2 288	source-based
Taxable payrolls	- 460	395	642	-1 721	797	279	70	- 2	2 184	economic/demog
Motor and insurance tax bases	317	122	- 234	- 191	- 167	4	116	32	591	economic/demog
Other taxes	0	0	0	0	0	0	0	0	0	economic/demog
Non-tax revenue	0	0	0	0	0	0	0	0	0	
TOTAL REVENUE	-1 681	9 154	-3 138	-11 117	3 895	1 439	1 050	398	15 936	
EXPENSE REQUIREMENTS										
Socio-demographic characteristics										
Population dispersion	-2 405	-1 939	1 318	635	107	876	- 356	1 764	4 700	geographic
Indigenous status	573	-3 772	1 633	312	- 340	241	- 172	1 524	4 283	demographic
Non-Indigenous disadvantage	- 199	- 299	534	- 166	530	161	- 394	- 167	1 225	demographic
Other SDC (a)	179	- 385	- 43	- 33	372	- 64	- 76	49	601	demographic
Administrative scale	-741	-520	-316	70	223	403	416	465	1 577	fixed costs
Wage costs	480	139	-514	430	-567	-227	197	63	1 308	economic
Population weighted density	853	320	-533	-244	-192	-127	-25	-52	1 173	geographic
Non-State sector	-912	-96	212	599	7	-39	192	37	1 048	demographic
Other expenses	-106	-924	650	648	-166	-29	-220	146	1 444	demographic
Cost of construction	275	-864	17	547	-106	-38	38	132	1 009	economic
Other investment expenses (b)	-194	803	-241	658	-727	-379	-379	460	869	demographic
TOTAL EXPENSE AND INVESTMENT	-2 198	-7 538	2 719	3 456	- 858	777	- 778	4 421	11 372	
Commonwealth payments	641	1983	-1201	-870	45	-186	163	-575	2831	
Total effect of assessed relativities	-3238	3597	-1618	-8531	3082	2030	435	4244	13387	

Source: CGC (2026, p. 35).

For modelling purposes, these drivers are aggregated to broader categories, somewhat based on those shown in Table 2. The final column of Table 3A shows, for each driver, the broader category (or categories) to which it has been classified.

Table 3B shows the estimated efficient transfers. It can be compared directly with the full equalisation transfers shown in Table 3A. As expected, removing inefficient equalisation would result in less redistribution between the states. As seen from the final row of the two tables, the amount of redistribution on an annual basis would fall from $13.4 billion to $10.6 billion.

Table 3B: Drivers of efficient fiscal equalisation

	NSW	Vic	Qld	WA	SA	Tas	ACT	NT	Redist	category
	$m	$m	$m	$m	$m	$m	$m	$m	$m	
REVENUE RAISING CAPACITY										
Mining production	4 382	8 942	-5 771	-10 726	1 874	600	627	72	16 497	full equalisation
Taxable land values	-3 632	- 482	1 892	1 004	643	248	218	109	4 114	full equalisation
Property sales	-2 288	177	333	517	749	307	19	186	2 288	full equalisation
Taxable payrolls	- 110	- 319	339	86	44	27	- 114	47	543	demographic only
Motor and insurance tax bases	- 66	- 191	203	52	26	16	- 68	28	325	demographic only
Other taxes	- 53	- 156	165	42	21	13	- 56	23	265	demographic only
Non-tax revenue	0	0	0	0	0	0	0	0		
GST: imputed less epc revenue	1 408	- 166	- 833	41	- 419	- 201	100	70	1 619	
GST: equalisation	- 248	- 722	767	195	99	62	- 259	106	1 229	demographic only
TOTAL REVENUE	- 607	7 083	-2 906	-8 788	3 036	1 073	468	642	12 302	
EXPENSE REQUIREMENTS										
Socio-demographic characteristics										
Population dispersion	0	0	0	0	0	0	0	0	0	nil equalisation
Indigenous status	573	-3 772	1 633	312	- 340	241	- 172	1 524	4 283	demographic
Non-Indigenous disadvantage	- 199	- 299	534	- 166	530	161	- 394	- 167	1 225	demographic
Other SDC (a)	179	- 385	- 43	- 33	372	- 64	- 76	49	601	demographic
Administrative scale	- 741	- 520	- 316	70	223	403	416	465	1 577	full equalisation
Wage costs	0	0	0	0	0	0	0	0	0	nil equalisation
Population weighted density	0	0	0	0	0	0	0	0	0	nil equalisation
Non-State sector	- 912	- 96	212	599	7	- 39	192	37	1 048	demographic
Other expenses	- 106	- 924	650	648	- 166	- 29	- 220	146	1 444	demographic
Cost of construction	0	0	0	0	0	0	0	0	0	nil equalisation
Other investment expenses (b)	- 194	803	- 241	658	- 727	- 379	- 379	460	1 921	demographic
TOTAL EXPENSE AND INVESTMENT	-1 401	-5 193	2 430	2 088	- 100	293	- 632	2 515	7326	
Commonwealth payments	641	1983	-1201	-870	45	-186	163	-575	2831	
Total effect of assessed relativities	-1367	3873	-1677	-7570	2982	1180	-1	2581	10616	

Given that the current equalisation method may be entrenched, we also consider to what extent the gains from moving from full to efficient equalisation could be achieved using a second-best policy of partial equalisation. The equalisation transfers under partial equalisation are shown in Table 3C. The equalisation rate applied in each row is shown in the final column.

In general, the partial equalisation scenario replaces full equalisation with 70% equalisation. This percentage of partial equalisation gives the highest outcome for consumer welfare compared to other percentages for partial equalisation. Compared to full equalisation, this partial equalisation would reduce the amount of redistribution between states on an annual basis from $13.4 billion to $9.0 billion (Tables 3A, 3C).

There are two rows in Table 3C where we retain full equalisation. We retain full equalisation for indigenous status because that principle is widely accepted. We also retain full equalisation for specific purpose payments to the states, so that those payments continue to be treated in the same way as general revenue payments to the states for the purposes of equalisation.

Table 3C: Drivers of 70% of full equalisation

	NSW	Vic	Qld	WA	SA	Tas	ACT	NT	Redist	equalisation rate
	$m	$m	$m	$m	$m	$m	$m	$m	$m	
REVENUE RAISING CAPACITY										
Mining production	3 067	6 260	-4 040	-7 508	1 311	420	439	51	11 548	70%
Taxable land values	-2 542	- 337	1 324	703	450	173	153	77	2 880	70%
Property sales	-1 601	124	233	362	524	215	13	130	1 601	70%
Taxable payrolls	- 322	277	449	-1 205	558	196	49	- 2	1 529	70%
Motor and insurance tax bases	222	85	- 163	- 133	- 117	3	81	23	414	70%
Other taxes	0	0	0	0	0	0	0	0	0	70%
Non-tax revenue	0	0	0	0	0	0	0	0	0	70%
TOTAL REVENUE	-1 177	6 408	-2 197	-7 782	2 727	1 007	735	279	11 155	
EXPENSE REQUIREMENTS										
Socio-demographic characteristics										
Population dispersion	-1 684	-1 357	923	444	75	613	- 249	1 235	3 290	70%
Indigenous status	573	-3 772	1 633	312	- 340	241	- 172	1 524	4 283	100%
Non-Indigenous disadvantage	- 139	- 209	374	- 116	371	113	- 276	- 117	857	70%
Other SDC (a)	126	- 270	- 30	- 23	261	- 45	- 53	34	420	70%
Administrative scale	-519	-364	-221	49	156	282	291	326	1 104	70%
Wage costs	336	97	-360	301	-397	-159	138	44	916	70%
Population weighted density	597	224	-373	-171	-134	-89	-18	-36	821	70%
Non-State sector	-639	-67	149	419	5	-28	134	26	733	70%
Other expenses	-74	-647	455	453	-116	-21	-154	102	1 011	70%
Cost of construction	192	-605	12	383	-75	-27	27	92	706	70%
Other investment expenses (b)	-136	562	-169	461	-509	-266	-266	322	1 345	70%
TOTAL EXPENSE AND INVESTMENT	-1 367	-6 408	2 393	2 513	- 702	616	- 596	3 552	9 074	
Commonwealth payments	641	1983	-1201	-870	45	-186	163	-575	2831	100%
Total effect of assessed relativities	-1903	1982	-1005	-6139	2069	1437	302	3256	9046	

3.3 Efficient and Inefficient equalisation

We now consider the empirical differences between full and efficient equalisation transfers in more detail. We examine the revenue and expenditures sides of state budgets in turn.

For tax revenue, there are six drivers in Table 3A. The first three drivers refer to drivers of source-based revenue: mining production (mining royalties), taxable land values (land tax) and property sales (conveyancing duty). Such source-based revenue should continue to be fully equalised, as established in section 2 and reflected in Table 3B.

The remaining three drivers of tax revenue refer to residence-based taxes. These residence-based taxes are payroll tax, motor and insurance taxes, and "other taxes". Revenue from residence-based taxes is driven by state incomes, which are influenced by demographic circumstances as well as economic circumstances.

Under the analysis of section 2, the equalisation process for these three residence-based taxes should be narrowed so that it is limited to demographic circumstances. The way in which we equalise residence-based taxes for demographic circumstances is detailed in section 4. The results can be seen in Table 3B.

In practice, the CGC only equalises two out of the three residence-based taxes. It does not equalise "other taxes", which is dominated by gambling taxes. This is because the gambling tax base is heavily affected by differences between states in state government regulation of gambling. Hence, in Table 3A, the equalisation transfers for "other taxes" are zero.

The final category of revenue in Table 3A is "non-tax revenue", which includes interest and dividends. The CGC argues that non-tax revenue is driven by population size rather than other factors such as population composition, so no equalisation is applied.

While the GST itself is not explicitly included in Table 3A, the GST does have its own implicit treatment under full equalisation. The starting point for the equalisation is unclear, because there is no suitable data on how much GST revenue is generated in each state. This is partly because the GST is collected by the central government, which imposes a uniform national rate of 10 per cent.

While the starting point for GST equalisation is unclear, we know the finishing point. In particular, the initial division of the GST pool is according to each state's share of the national population, which corresponds to the outcome under full equalisation. Thus, GST revenue itself is fully equalised between states, but from an unspecified starting point.

Under the efficient approach of Table 3B, the GST should be subject to limited equalisation, rather than full equalisation, because it is a residence-based tax. To put GST equalisation on the same footing as equalisation of other residence-based taxes, it is necessary to use the same starting point, namely the amount of revenue raised in each state. Because GST is a mainly a consumption tax, we impute the amount of GST revenue raised in a state by applying a state's share of national household final consumption expenditure to national GST collections. These imputed GST collections are then subject to limited equalisation. These two steps are shown as separate lines in Table 3B.

Turning to the expenditure side of the budget, many of the drivers, such as indigenous status, are demographic-related, as seen in the last column of Table 3A. If a state has a high concentration of people from a demographic group that requires a high level of government services, it is important to equalise for this, in line with the analysis of efficient equalisation in section 2. Otherwise, the resulting high state tax burden will lead to inefficient, fiscally-induced outward migration.

Some of the drivers on the expenditure side of the budget are geographic, the most important being population dispersion. As noted above, the CGC does not fully equalise for geographic circumstances but rather partially equalises by funding like services in like areas. As discussed

earlier, cost factors such as geographic circumstances ought not to be equalised from an efficiency perspective. This is reflected in Table 3B where equalisation for geographic circumstances is removed.

The next expenditure driver is administrative scale. This refers to the fixed costs of providing state government services. The division of Australia into eight states and territories with eight sets of fixed costs is a given or "natural" feature of the environment in which equalisation is designed to operate. The analysis in section 2 found that such fixed costs should be fully equalised, so that location decisions can be based efficiently on marginal costs and benefits.

The final expenditure driver is wage and construction costs. As discussed above, from an efficiency perspective there should be no equalisation for costs. Hence there is no equalisation for wage or construction costs under the efficient approach of Table 3B.

3.4 Previous Australian estimates of gains from HFE

This section considers previous estimates for Australia of the efficiency effects of a full equalisation system.

Dixon et al. (2002) use a "general equilibrium model that was tailor-made for examining the welfare effects of variations in the Commonwealth/State funding arrangements". They simulate repealing the full equalisation system and distributing the GST on a purely equal per capita (EPC) basis. They estimate this would result in a welfare *gain* of $169 million in 2000/01 terms. They suggest that "the major source of gain from reducing subsidisation in the allocation of Commonwealth grants is that it will take money away from State governments that do not spend it in accordance with household preferences" because of the so-called "flypaper effect" (Dixon et al. 2002, p19).

Independent Economics (2015), led by the author of this paper, also used a multi-regional CGE model but assumed that State governments do spend in accordance with household preferences. They estimate a gain in annual consumer welfare of $521 million in 2015/16 from the Australian equalisation system, compared to a situation in which all equalisation adjustments, except on account of indigeneity, were abandoned. This welfare gain arises primarily from equalisation of source-based taxes, notably mining royalties.

Independent Economics (2015) found in favour of fiscal equalisation whereas Dixon et al. (2002) find against it for two main reasons. First, real mineral prices were much higher in 2015 than in 2002, so the gains from equalising mining royalties were much larger in Independent Economics (2015). Second, Dixon et al. (2002) incorporate the flypaper effect, which, if valid, would be a cost of equalisation.

In Murphy (2018), I moved away from a CGE analysis of alternative equalisation schemes to follow Albouy (2012) by using a theoretical analysis of an efficient scheme. This paper takes Murphy (2018) further by fully analysing the theoretical differences with Albouy (2018) and updating for the latest data and policy environment.

At the same time, I find that full equalisation is preferable to no equalisation for similar reasons to Independent Economics (2015). Real mineral prices remain high and, like Albouy (2012), I do not include a flypaper effect. As we shall see in section 5, our estimate of the gain in annual consumer welfare from full equalisation is $921 million in 2026/27. While this is up from the Independent Economics estimate of $512 million, this increase is consistent with the growth in nominal GDP from 2015/16 to 2026/27.

4 FULL AND LIMITED EQUALISATION IN PRACTICE

This section explains how we applied equalisation principles to generate the results for efficient fiscal equalisation in Table 3B. Those results were generated using a combination of full and limited equalisation.

Full equalisation was used for source-based taxes and the fixed costs of government. The estimates under full equalisation come from CGC (2026, p.35) and so do not need to be explained here.

Limited equalisation was used for the components of the net fiscal benefit. The estimates under limited equalisation are our own and this section explains how we obtained them.

We begin by showing algebraically how full and limited equalisation differ when applied to the net fiscal benefit, *nfb*. Then, we take the two components of the net fiscal benefit, government variable costs less residence-based taxes, and explain how we obtained limited equalisation estimates for both components.

4.1 Full and Limited Equalisation

We derived our fiscal equalisation formula in the Appendix and explained it in section 2.2. The formula is reproduced below as equations [29] and [30]', where equation [30]' is a simplified version of equation [30].

$$fe^j = GF\left[PG^j/N^j - \sum_j PG^j/N\right] - \left[tL^j r^j L^j/N^j - \sum_j tL^j r^j L^j/N\right] - \left[tK\, i^j K^j/N^j - \sum_j tK\, i^j K^j/N\right] + \sum_e \left(N_e^j/N^j - N_e/N\right)\overline{nfb}_e \quad [29]$$

$$\overline{nfb}_e = \frac{1}{N^e}\sum_j N_e^j nfb_e^j \quad [30]'$$

Limited equalisation is applied to the net fiscal benefit in the final (fourth) term of equation [29], which we call *fe4*. That term is expanded into two separate terms in equation [31].

$$fe4^j = \sum_e N_e^j/N^j\, \overline{nfb}_e - \sum_e N_e/N\, \overline{nfb}_e = \sum_e N_e^j/N^j\, \overline{nfb}_e - nfb/N \quad [31]$$

Under full equalisation (which is efficient in the case of source-based taxes) the fourth term is simpler. We call that version of the term *fe5*. Under full equalisation, the state is funded for the difference between state and national net fiscal benefits per capita.

$$fe5^j = nfb^j/N^j - nfb/N \quad [32]$$

Equations [31] and [32] express the net fiscal benefit component of the equalisation transfer in per capita terms. To convert it to dollar terms, we multiply through by the state population and switch to upper case to represent the raw dollar values. We also rearrange the equations to use

the national net fiscal benefit, *nfb*, as a common factor. This provides a different perspective that is based on state shares of national totals.

$$FE4^j = nfb\left\{\sum_e \left(N_e^j \overline{nfb_e}\right)/nfb - N^j/N\right\} \quad [33]$$

$$FE5^j = nfb\left\{nfb^j/nfb - N^j/N\right\} \quad [34]$$

The full equalisation version, equation [34], implies that a state receives an equalisation transfer from other states if the state share of the national net fiscal benefit exceeds the state share of the national population. However, a state may have a higher-than-normal net fiscal benefit due either to state policy decisions (generous spending programs or low tax rates) or a true fiscal disadvantage.

To attempt to make the equalisation process policy neutral, the CGC replaces state shares of the net fiscal benefit with state shares of the underlying expenditure and tax bases. Taking into account that the net fiscal benefit is the difference between spending, *gov*, and residence-based tax revenue, *rev*, and calling the corresponding bases, *gbase* and *tbase*, the limited and full equalisation versions of the equations are as follows. These equations are intended to measure state fiscal disadvantage.

$$FE4^j = gov\left\{\sum_e \left(N_e^j \overline{gbase_e}\right)/gbase - N^j/N\right\} - rev\left\{\sum_e \left(N_e^j \overline{tbase_e}\right)/tbase - N^j/N\right\} \quad [35]$$

$$FE5^j = gov\left\{gbase^j/gbase - N^j/N\right\} - rev\left\{tbase^j/tbase - N^j/N\right\} \quad [36]$$

Under full equalisation in equation [36], if a state's share of the national spending base exceeds its share of the national population, it is funded for the resulting additional expenditure. Similarly, equation [36] also shows that if a state's share of the national revenue base falls short of its share of the national population, it is funded for the resulting revenue shortfall. That is, the state is funded for fiscal disadvantages on both the expenditure and revenue sides of its budget. This occurs irrespective of the reasons for those fiscal disadvantages.

Under limited equalisation in equation [35], this funding of fiscal disadvantages is only forthcoming to the extent that fiscal disadvantages are explained by a state's population composition. This is because, in the case of net fiscal benefits, it is efficient to equalise for fiscal disadvantages arising from a state's population composition but not for fiscal disadvantages generated by other factors. This was proven in the Appendix and explained in section 2.2. For example, compensating higher amenity-lower wage states for the lower tax bases associated with lower wages will encourage inefficient migration to those states.

This limited equalisation targeted at population composition is achieved in equation [35] by taking each labour type and using national-level instead of state-level spending and tax bases. This removes fiscal advantages and disadvantages that arise if a particular type of labour

generates a lower or higher revenue or spending base in that state than at the national level. It retains fiscal advantages and disadvantages that arise if a state's mix of labour types differs from the national mix.

Notice that the transfers in equations [35] and [36] are based on differences in state shares, applied to a national total. Because state shares always sum to unity, differences in state shares always sum to zero. Hence the transfers in each row of Tables 3A-3C always sum across states to zero.

To apply limited equalisation using equation [35], we need to calculate spending and tax bases at the national level for different population types. Those national bases are calculated using equations [37] and [38].

$$\overline{gbase}_e = \sum_j \left(N_e^j gbase_e^j\right)/N^e \qquad [37]$$

$$\overline{tbase}_e = \sum_j \left(N_e^j tbase_e^j\right)/N^e \qquad [38]$$

To use these equations, we need to divide the population, *N*, into types, *e*, and construct data for *gbase* and *tbase* for each type in each state.

4.2 Government variable costs

On the expenditure side of state budgets, the CGC already separately equalises for demographic factors, as can from the "category" column in Table 3A and Table 3B. This would involve it using the equivalent of equation [37]. Hence, we do not need to perform our own limited equalisation of expenditures.

Instead, we simply retain the CGC equalisation for demographic factors and administrative scale in moving from Table 3A to Table 3B while removing the inefficient equalisation for the other factors. The broad effect of limiting equalisation of spending in this way is to reduce the amount of redistribution between states on the spending side of the budget. It falls from $11.4 billion (Table 3A) to $7.3 billion (Table 3B). Of this remaining equalisation of spending, the most important driver is equalisation for indigenous status. It accounts for $4.3 billion out of the remaining $7.3 billion in redistribution.

4.3 Residence-based taxes

We now explain the method we have developed for applying limited equalisation to residence-based taxes. We can see the type of data that we need from equations [35] and [38].

From equation [35], we need data on revenue at the national level for each state residence-based tax, *rev*. We obtain this data from the 2026/27 CGC (2026, p.35) equalisation assessments, and it is shown here in the final column of Table 5. The four state taxes we identify as being residence-based are GST, payroll tax, motor & insurances taxes and other

taxes, which include gambling taxes. These are the taxes that we apply limited (demographically-based) equalisation to in Table 3B.

To apply equation [38], there are two steps. First, we need to define population types to use to construct a population mix for each state. Second, we need to calculate the contribution per member of each population type to the tax base at the national level. The information for both of these steps was obtained from the 2021 Census data, which is the latest Census for which data was available at the time of writing.

In the first step, the population was cross-classified based on the three attributes of age, indigenous status and education level. The aim was to choose attributes that influence income and stay with a person. This is distinct from other attributes such as occupation or industry of employment, which may change over a lifetime. Use of these three attributes resulted in a total of 570 labour types based on 19 age categories by 3 indigenous status categories by 10 educational level categories.

The 19 age categories for the labour types are constructed using 5-year age groups. These groups extend from those aged 0 to 4 to those aged 85-89, with a final group aged 90 and over. The final age-group was constructed by aggregating three age groups in the original data. This aggregation was necessary so that there are sufficient numbers of people in each of the final types to support a statistically meaningful analysis.

The three indigenous status categories are indigenous, non-indigenous and not stated. The indigenous category was obtained by aggregating three separate categories found in the original data: aboriginal; Torres Strait Islander; and both aboriginal and Torres Strait Islander. Again, this aggregation was necessary so that there are sufficient numbers of people in each of the final types to support a statistically meaningful analysis.

In the data there are ten educational categories: Postgraduate Degree Level; Graduate Diploma and Graduate; Bachelor Degree Level; Advanced Diploma and Diploma; Certificate III and IV level; Secondary Education – Years 10 and above; Certificate I and II level; Secondary Education – Years 9 and below; Supplementary Codes; and Not stated. Those ten original categories are used without any aggregation.

This cross-classification of the population into these 570 types was performed both at the national level and for each state and territory.

In the second step, we need to estimate the tax base at the national level for each labour type. The best measure available from the 2021 Census for the tax base for residence-based taxes is personal income. Average annual personal income at the national level is $42,600, as shown in Chart 1.

When we apply equation [38], we find there is considerable variation in income across the 570 types relative to the average income of $42,600. The top-earning type is people aged 50 to 54,

who are non-indigenous and have a Postgraduate Degree. Their average personal income is $127,300. This high variation suggests that the three attributes taken together are informative about how population composition affects personal incomes.

We now use this information on the average income of each type at the national level in equation [35]. Again, there are two steps. First, we predict personal income for each state based on its population composition, and second we calculate the equalisation transfers.

In the first step, we apply a state's population composition to the national information on income for each type that was calculated above. This generates a prediction of each state's average personal income. Those predicted incomes are shown in the blue bars of Chart 1. Using this method, variations between states in their predicted incomes per head are due to variations between states in their population composition, rather than variation between states in income received by the same labour type.

Chart 1: Predicted and Actual Personal Income Per Head by State and Territory ($'000 per year, 2021)

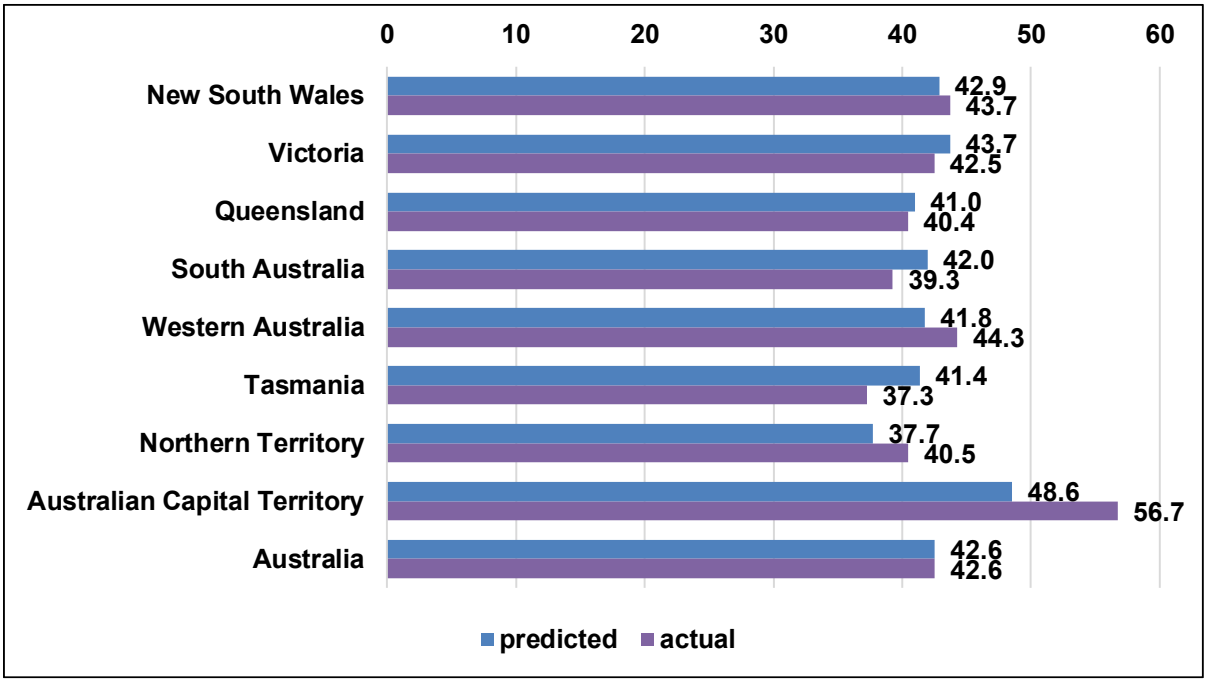


Chart 1 shows that predicted annual personal income per head is within two per cent of the national figure of $42,600 for three states – NSW, SA and WA. This suggests that, in 2021, population composition had a broadly neutral impact on the ability of these three states to raise revenue from state residence-based taxes.

The remaining five states show some variation in how population composition affects their ability to raise revenue from state residence-based taxes. Victoria has a small fiscal advantage of around 3 per cent, while Tasmania and Queensland have small fiscal disadvantages of 3 and 4 per cent respectively. The outliers are the territories, with the ACT having a fiscal advantage of around 14 per cent and the NT a disadvantage of around 11 per cent. Thus, limited

equalisation applied to residence-based taxes would result, in part, in a positive transfer for the NT and a negative transfer for the ACT, based on the 2021 Census.

As noted above, full equalisation differs from limited equalisation by using actual state tax bases, as in equation [36], rather than state tax bases predicted from population composition alone, as in equation [35]. Chart 1 shows noticeable differences for some states and territories between their predicted and actual per capita incomes, indicating that applying full equalisation rather than limited equalisation may result in significant locational inefficiencies.

For example, the ACT achieves actual per capita incomes that are 33 per cent above the national benchmark, despite its population composition predicting that it would be only 14 per cent above that benchmark. Under limited equalisation, this outperformance is not neutralised so that it can act as a market signal for migration to the ACT. Applying full rather than limited equalisation for residence-based taxes blunts this market signal.

In the second step we calculate the transfers under limited equalisation, as shown in the rows of Table 4. For each state, the predicted personal income per head from Chart 1 is multiplied by population to estimate the state's predicted tax base (i.e. the first row of the body of the table is multiplied by the second row to obtain the third row). This predicted tax base is then calculated as a share of the national tax base in the fifth row of the table. In line with equation [35], the gap between a state's share of the population (shown in fourth row of the table) and its predicted share of the tax base is then applied to national revenue to obtain the state's equalisation payment for residence-based taxes in the final row of Table 4.

The same final outcome for limited equalisation of residence-based taxes is also obtained when it is applied to each of the four revenue categories separately, rather than in aggregate. This is shown in Table 5, which is the source for the equalisation transfers for the four categories shown in Table 3B.

The proposed move from full to limited equalisation of state residence-based taxes has two types of effects on equalisation transfers, which we can see by moving from Table 3A to Table 3B. The first effect is that there is less redistribution between states for the two categories of residence-based taxes that are part of the existing equalisation system, payroll tax and motor & insurance taxes. This redistribution falls from $2.1 billion (Table 3A) to $0.9 billion (Table 3B). To calculate these redistribution amounts, the rows for the two taxes need to be added together before (not after) the redistribution amounts are calculated.

The second effect is that additional residence-based taxes are equalised under limited equalisation, the GST and "other taxes", as required for an efficient equalisation policy. The amount redistributed between states for these two taxes combined is $1.7 billion.

The overall effect of these changes on the amount redistributed between states for residence-based taxes considered as a group changes little, from $2.1 billion to $2.3 billion. Thus, the reduction in redistribution from replacing full equalisation with limited equalisation is

approximately offset by the increase in redistribution from adding the two additional taxes to the redistribution system. However, the pattern of redistribution between states does change somewhat under an efficient equalisation system.

Table 4 provides a good start in calculating limited equalisation for residence-based taxes, but some further refinements could be made. For example, it should be taken into account that, in effect, the general government sector is exempt from payroll tax. This confers a fiscal disadvantage on the ACT in particular, which the CGC already appropriately takes into account.

Table 4: Limited equalisation of residence-based taxes: calculations, 2026/27

	NSW	Vic	Qld	WA	SA	Tas	ACT	NT	AUS
predicted income/head ($,000 per year)	42.9	43.7	41.0	41.8	42.0	41.4	48.6	37.7	42.6
population ('000 persons)	8,072	6,503	5,156	2,660	1,782	558	454	233	25,418
predicted state personal income ($m)	346,100	284,352	211,308	111,127	74,762	23,075	22,067	8,777	1,081,569
share of population	31.76%	25.59%	20.29%	10.47%	7.01%	2.19%	1.79%	0.92%	
share of predicted income	32.00%	26.29%	19.54%	10.27%	6.91%	2.13%	2.04%	0.81%	
population share less predicted income share	-0.24%	-0.70%	0.75%	0.19%	0.10%	0.06%	-0.25%	0.10%	
national revenue from residence-based taxes ($m)									197,005
limited equalisation for residence-based taxes ($m)	-477	-1388	1474	375	190	119	-497	204	0

Table 5: Limited equalisation of residence-based taxes: by tax ($ million), 2026/27

	NSW	Vic	Qld	WA	SA	Tas	ACT	NT	AUS	Revenue
Taxable payrolls	-110	-319	339	86	44	27	-114	47	0	45,263
Motor and insurance tax bases	-66	-191	203	52	26	16	-68	28	0	27,134
Other taxes	-53	-156	165	42	21	13	-56	23	0	22,094
GST: equalisation	-248	-722	767	195	99	62	-259	106	0	102,515
limited equalisation for residence-based taxes ($m)	-477	-1388	1474	375	190	119	-497	204	0	197,005

5 WELFARE AND POPULATION EFFECTS OF EQUALISATION POLICY OPTIONS

In this section we evaluate alternative equalisation policies by estimating their long run effects on consumer welfare and state populations. The equalisation policies that we evaluate include full, efficient, partial and minimal equalisation. We also evaluate two donor relief policies, including the new Australian system of standard state equalisation.

In calculating the effect of each policy on consumer welfare, one of the policies needs to be chosen as the reference point. For analytical purposes, the appropriate reference point is efficient equalisation. Because efficient equalisation is designed as a Pareto optimum, we can readily calculate the welfare losses from departing from it under alternative policies. This gives us our initial estimates of welfare losses.

For policy purposes, the better choice of reference point is probably full equalisation. Full equalisation was used in Australia for four decades, the Productivity Commission (2026) has recommended that it be reinstated, and some early literature considered that full equalisation was efficient. We convert our reference point to full equalisation by taking the initial welfare losses and subtracting the initial welfare loss from full equalisation. This gives us the final estimates of welfare effects, relative to full equalisation. The effects on state populations are converted in a similar way.

There are four specific policy questions that we address in this section.

1) Would it be beneficial to largely abandon full equalisation by moving to minimal equalisation?

2) Were the donor relief schemes considered in 2018 better or worse than the full equalisation scheme that was already in place? These donor relief schemes are the grants scheme recommended by the Productivity Commission (2018) and the standard state scheme that was legislated by the government in response.

3) Is efficient equalisation a material improvement on full equalisation?

4) Can partial equalisation provide most of the benefits of efficient equalisation?

We address each of those policy questions in turn. But first we explain how we calculate the welfare effects of each policy.

5.1 Welfare effects

Our initial estimates of welfare effects are relative to the Pareto optimum policy of efficient equalisation. The interstate transfers under efficient equalisation were shown in the final row of Table 3B. By varying the pattern of interstate transfers from that efficient pattern, the other policy scenarios distort locational decisions for labour, giving rise to welfare losses.

Albouy (2012, p.834) estimates the welfare losses from inefficient equalisation polices using a deadweight loss (DWL) formula. The welfare losses depend on to what extent fiscal equalisation transfers deviate from their efficient levels and the sensitivity of state populations to those deviations.

The DWL formula measures the state population sensitivity using the long-run elasticity of a state's population with respect to changes in its real income per capita, when income changes due to a change in the state's net fiscal benefit. Drawing on North American evidence, in an earlier study Albouy (2009) uses a population elasticity, ε, of 6.0 for migration between US cities. In the Albouy (2012) study discussed in this paper he uses a lower population elasticity of 3.23 for migration between Canadian provinces. It makes sense that the inter-provincial elasticity is smaller than the inter-city elasticity, because some inter-city migration will be intra-provincial rather than inter-provincial.

In this study we adopt Albouy's (2012) inter-provincial population elasticity for Canada of 3.23 as our inter-state population elasticity for Australia. Canada is widely considered to be the economy most similar to Australia. They are both advanced economies with a specialisation in natural resource industries and with broadly similar geographic sizes and population levels. Hence, we apply the estimate for Canada to Australia.

Albouy (2012) observes that: "employment and deadweight loss predictions are robust to many assumptions of the model, since they are simulated from a reduced-form parameter, which may include many un-modelled effects" (Albouy, 2012). Further, a by-product of these DWL calculations is estimates of percentage impacts on state populations. Besides using this reduced form approach based on the DWL formula, we also use a more structural approach as an alternative.

Our alternative approach for estimating national welfare and state effects is to use a highly stylised empirical version of the full theoretical model set out in the Appendix. The stylised model represents state production, state fiscal (fixed and variable) advantages and disadvantages and the fiscal equalisation system. However, it also simplifies, mainly by abstracting from capital and multiple types of labour. In the interests of brevity, here we focus on explaining how we have incorporated the value of the population elasticity into the stylised model, because that elasticity is central to the welfare estimates.

In the full theoretical model of the Appendix, the equilibrium condition for interstate migration is given by equation [2]. It specifies that a given type of labour, *e*, migrates between states until its welfare, V_e, is the same in every state, $j=1...J$, achieving horizontal equity.

$$V_e = V_e(PC^j, PG^j, y_e^j, Q_e^j) \qquad [2]$$

In our stylised model, we replace equation [2] with the simpler equation [2s]. The simpler equation no longer distinguishes between labour types. To limit inward migration, it introduces

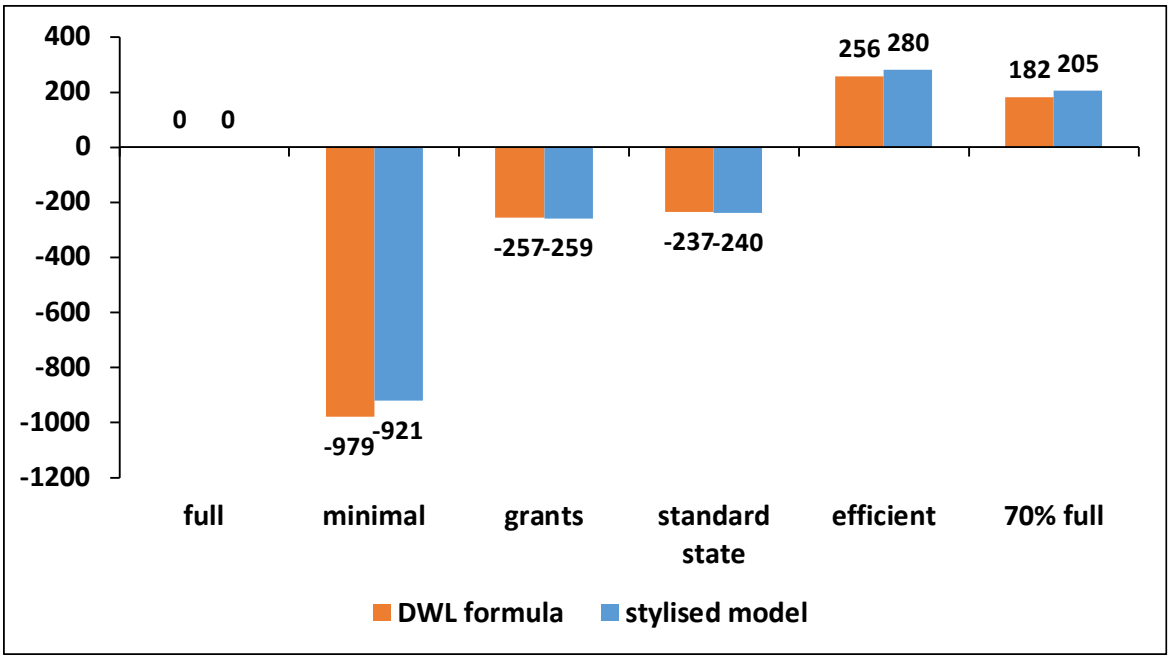
a direct disamenity from a higher state population, compared to the indirect approach in the full model of allowing for diminishing returns to labour in state production.

$$V = \left(\frac{N^j}{N^{j*}}\right)^{-\frac{1}{\varepsilon}} \frac{y^j}{P(PC^j, PG^j)} \qquad [2s]$$

In equation [2s], the utility of an individual in state j depends on their real income in that state, y^j, and the ratio of the actual population, N^j, to the efficient population of that state. However, utility, V, is determined at the national level, so equation [2s] can be interpreted as a state-level relationship between N^j and y^j. If we consider the effect of a change in y^j on N^j, we see that the population elasticity measuring the responsiveness in N^j is given by ε in the equation. Thus, equation [2s] provides a way of incorporating the population elasticity in the stylised model[2].

We now compare the estimates under both methods of the welfare effects of each equalisation policy. Chart 2 shows that the welfare estimates for each policy are similar irrespective of whether they are generated using the DWL formula or the stylised model. From now on, we use the results from the stylised model because it provides a fuller picture of fiscal and economic outcomes of equalisation policies than does the DWL method.

Chart 2: Two Methods of Estimating Welfare Effects
(deviations from full equalisation baseline, $m per year)



[2] This interpretation abstracts from the fact that V is endogenous when we consider all of the equations of the stylised model. Also, equation [2s] includes a population congestion effect that is not part of our theoretical model or efficient equalisation formula.

To estimate the population and welfare effects, a baseline year needs to be chosen. The latest CGC (2026, p. 35) assessment of full equalisation transfers is for 2026/27, which is the baseline year chosen here. The CGC calculated these transfers in the usual way by assessing state fiscal capacities in the latest three historical years of 2022/23, 2023/24 and 2024/25, and then projecting forward to 2026/27 using forecasts for growth in population and GST revenue.

The basis for the CGC equalisation transfers for 2026/27 in terms of equalisation drivers was shown in Table 3A. The final row of Table 3A gives the transfers that we use in our baseline scenario of full equalisation.

We now turn to the modelling results for the various policy scenarios in a series of four sub-sections. These sub-sections cover in turn minimal equalisation, donor relief equalisation schemes, efficient equalisation and partial equalisation. Each sub-section answers one of the four policy questions that we posed at the beginning of this section. As noted above, the effects of each scenario are reported as deviations from a baseline policy of full equalisation.

5.2 Minimal equalisation

We now address the first policy question that were posed at the beginning of this section. Would it be beneficial to largely abandon full equalisation by moving to minimal equalisation?

While federations including Australia, Canada and Germany have formal fiscal equalisation programs, some other federations, including the USA, do not. Further, in Australia, some donor states have called for the abolition of fiscal equalisation. So, in our first policy scenario, we model the effects of largely abandoning fiscal equalisation. In this minimal equalisation scenario, we retain equalisation for indigeneity because that principle is widely accepted.

Table 6 compares equalisation transfers under minimal equalisation with those under full equalisation. These transfers are taken from Table 3A, where the minimal transfers can be found in the 'indigenous status' row and the full equalisation transfers in the bottom row. Three states receive higher transfers under minimal equalisation, NSW, Queensland and, most notably, WA, while the other five states and territories receive lower transfers.

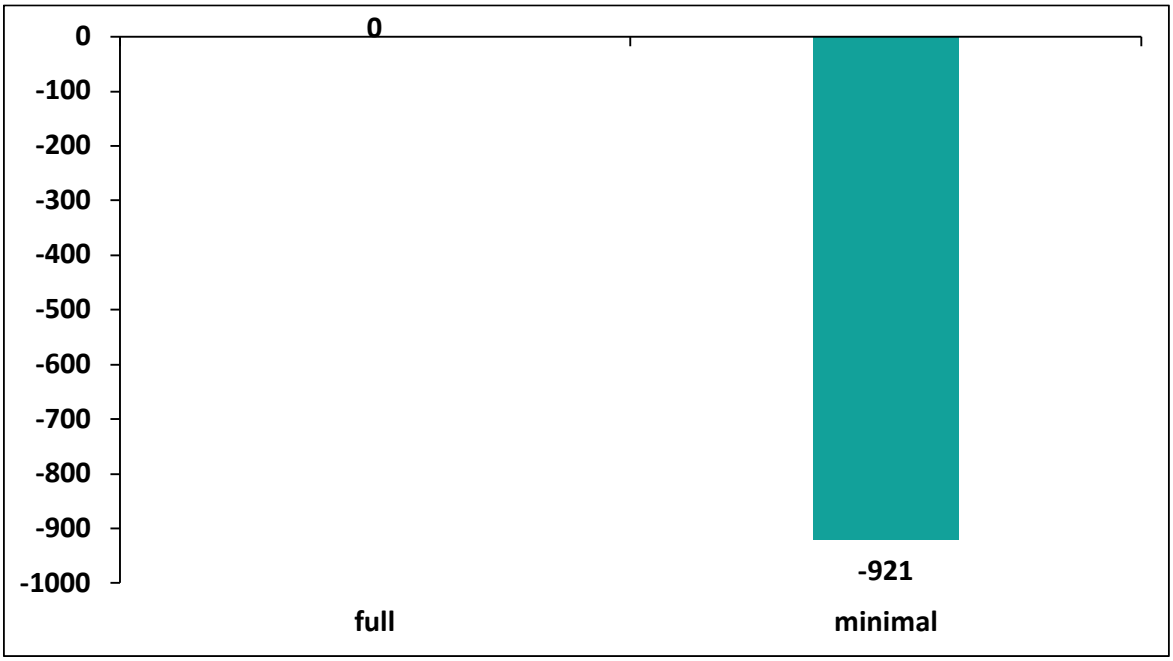
Table 6: Baseline and Minimal equalisation transfers ($ million)

	baseline (full equalisation)	minimal
NSW	-3,238	573
Vic	3,599	-3,772
Qld	-1,621	1,633
WA	-8,531	312
SA	3,083	-340
Tas	2,030	241
ACT	435	-172
NT	4,244	1,524
Total	0	0
Redistribution	13,390	4,283

Welfare and population effects

Moving from full equalisation to minimal equalisation system results in a loss in consumer welfare of $921 million in 2026/27, as seen in Chart 3. This is because some efficient equalisation is removed, including equalisation for source-based taxes (e.g. mining royalties), population composition and administrative scale. This welfare loss occurs despite the fact that some inefficient equalisation is also removed, including equalisation for non-demographic drivers of residence-based taxes and government spending. The welfare loss would be even larger if equalisation for indigenous status were also removed, because it is a form of efficient equalisation for population composition.

Chart 3: Welfare impact of Minimal equalisation
(deviations from full equalisation baseline, $m per year)



When state equalisation transfers are re-expressed on a per capita basis, WA has the biggest increase and the NT and Tasmania the biggest decreases in moving from full to minimal equalisation. WA gains mainly from removing the efficient equalisation of mining royalties. NT loses significantly from removing the inefficient equalisation for population dispersion and removing the efficient equalisation for administrative scale. Tasmania loses significantly from removing the inefficient equalisation for population dispersion and removing the efficient equalisation for mining royalties.

These gains and losses in equalisation transfers impact on state government budgets, requiring other fiscal adjustments to maintain fiscal balance. For example, when Tasmania loses equalisation transfers, the Tasmanian government rebalances its budget by raising residence-based taxes (which reduces household consumption) and by reducing government consumption. To maintain the optimal ratio of household consumption to government consumption, the increase in residence-based tax is larger than the reduction in government consumption.

These reductions in household and government consumption lead to lower consumer welfare in Tasmania, as well as in other states where equalisation transfers decrease. This triggers migration from states with decreased transfers to states with increased transfers. Such population adjustments continue until they bring consumer welfare in each state back into alignment in accordance with equation [2s]. Thus, moving to a less efficient system of fiscal equalisation ultimately results in the same welfare loss for consumers in every state.

The pattern of gains and losses in equalisation transfers leads to a similar pattern of gains and losses in population. Table 7 shows that, in the long run, there is a population gain of 10% for WA and population losses of 12% and 42% respectively for Tasmania and the NT.

Table 7: Population impacts of minimal equalisation
(deviations from full equalisation baseline, per cent)

NSW	1.8%
Vic	-3.8%
Qld	2.2%
WA	10.3%
SA	-6.9%
Tas	-11.9%
ACT	-4.3%
NT	-41.7%
Total	0.0%

The population loss in the NT in this scenario of 42% is far the largest percentage population loss for any state or territory in any of the scenarios. This result is driven by the large impact of minimal equalisation on NT residents via the NT budget. The NT equalisation transfer falls from $4.2 billion to $1.5 billion (Table 6), a decrease of $2.7 billion. By comparison, in 2026/27 the NT government is projected to raise only $1.3 billion in its own taxes and royalties. Using our stylised model, we simulate that a move to minimal equalisation would result in an increase in the average rate of residence-based tax in the NT equivalent to 13.4% of NT resident income. This very large tax increase combined with the assumed population elasticity of 3.23, is consistent with the large percentage population loss.

By the same token, the population gain in WA in this scenario is the largest percentage population gain for any state in any of the scenarios. The WA equalisation transfer rises from -$8.5 billion to $0.3 billion (Table 6), an increase of $8.8 billion. As a result, we simulate a decrease in the average rate of residence-based tax in WA equivalent to 2.5% of WA resident income. One way a tax reduction of this size could be implemented is through the total abolition of WA payroll tax, a tax that is projected to raise $6.5 billion in 2026/27. This would establish WA as a tax haven for payroll tax, which would artificially attract businesses and workers to WA. This would make the national labour market less efficient.

We can now answer the first of the policy questions that were posed at the beginning of this section. Would it be beneficial to largely abandon full equalisation by moving to minimal equalisation? Clearly not, because it would result in an annual welfare loss of $921 million.

This welfare loss occurs because under full equalisation, considerably more of the equalisation is efficient than inefficient. Also, minimal equalisation would create the conditions for WA to become a tax haven for payroll tax and lead to a massive shrinkage in the NT economy.

5.3 Donor relief equalisation

We now address the third policy question that was posed at the beginning of this section. Were the donor relief schemes considered in 2018 better or worse than the full equalisation scheme that was already in place?

The first donor relief scheme is grants equalisation, which was recommended by the Productivity Commission (2018) in 2018. The second donor relief scheme is standard state equalisation, which the government adopted in response to the Productivity Commission report and is still in place.

Grants equalisation

In the final report of its 2018 Inquiry into "Horizontal Fiscal Equalisation", the Productivity Commission (2018) recommends that full equalisation be replaced with a system that they describe as "equalisation to the average of all states" (ETA). The PC asserts that the ETA provides a "reasonable" level of equalisation, which is a loose and unusual economic objective.

In contrast, the efficient equalisation system proposed in this paper is based on the usual economic objective of maximising consumer welfare. Here we analyse how the PC's proposed system would affect consumer welfare.

The PC's ETA policy is mathematically equivalent to the grants equalisation scheme that is discussed in the literature. Hence, hereafter we refer to it as grants equalisation.

Under grants equalisation, the full equalisation transfers are calculated first. These are shown in column (1) of Table 8A, which is taken from Table 6. Then, the donor states (NSW, Queensland and WA) are relieved of their obligation to directly fund recipient states. Most notably, WA no longer pays its equalisation transfer of $8.5 billion. This leaves only the "initial grants" to the recipient states, which are shown in column (2). However, these grants now need a new funding source.

Under grants equalisation, the initial grants to the recipient states are funded by reducing the general revenue pool for the states. Under this smaller general revenue pool, there is in a uniform reduction in the per capita grant that each state receives, as reflected by the "cost of grants" in column (3) of Table 8A. The "initial grants" adjusted for the "cost of grants" then determines the effective final equalisation transfers appearing in the final column.

Table 8A: Grants equalisation transfers ($ million)

	(1) base (full equalisation)	(2) initial grants	(3) cost of grants	(4)=(2)+(3) final transfer
NSW	-3,238	0	-4,157	-4,157
Vic	3,599	3,599	-3,437	162
Qld	-1,621	0	-2,756	-2,756
WA	-8,531	0	-1,486	-1,486
SA	3,083	3,083	-916	2,166
Tas	2,030	2,030	-275	1,755
ACT	435	435	-235	199
NT	4,244	4,244	-128	4,116
Total	0	13,390	-13,390	0
Redistribution	13,390			8,399

Alternatively, the cost of the grants could be funded via the central government budget rather than via the general revenue pool. However, the final outcome for taxpayers in each state is likely to be similar in both cases. If the grants are funded from the state revenue pool, taxes are likely to be higher at the state level. If the grants are funded by the central government, taxes are likely to be higher at the federal level. It makes no real difference to taxpayers which level of government charges them higher taxes to fund the grants.

Compared to full equalisation, the grants scheme has two clear flaws. First, the five fiscally disadvantaged states are required to partly self-fund their own fiscal disadvantage in column (3). As a result, these five states each lose $476 per capita in equalisation transfers.

Second, the grants scheme fails to take into account the differences in the sizes of the fiscal advantages enjoyed by the three fiscally advantaged states because it sets all of their transfers to zero in column (2). This particularly benefits WA as the most fiscally advantaged state. The final outcome is that WA gains $2,256 per capita in equalisation transfers, while NSW loses $105 per capita and Queensland loses $196 per capita.

In raw dollar terms, the annual equalisation transfer that WA pays shrinks from $8.5 billion to $1.5 billion or by $7.0 billion. The amount of redistribution between states falls from $13.4 billion under full equalisation to $8.4 billion under grants equalisation (Table 8A).

In summary, in per capita terms, a move from full equalisation to grants equalisation results in a large budget gain to WA, uniform substantial losses to the five recipient states and smaller losses to the two remaining donor states.

Standard state equalisation

Instead of adopting the Productivity Commission (2018) recommendation for grants equalisation, the government decided to introduce what it calls “standard state” equalisation. However, the effects of the two policies are very similar.

Both policies result in a large increase in the per capita transfer to WA, paid for by lower per capita transfers to the other seven states. Under "standard state" equalisation the reduction in per capita transfers in generally the same for the seven losing states. As we saw above, under grants equalisation the reductions are less for the two donor states, NSW and Queensland, than for the recipient states.

Under standard state equalisation, either NSW or Victoria is designated as the standard state, depending on which has the higher assessed fiscal capacity per capita. To date, the standard state has always been NSW. Under standard state equalisation, no state can be assessed to have a higher fiscal capacity per capita than the standard state (NSW).

WA has benefitted greatly from this NSW-based limit, because WA's actual fiscal capacity has been well over that of NSW in all of the most recent assessment years, which are 2022/23, 2023/24 and 2024/25. These three assessment years feed in to determine equalisation transfers in the latest application year, which is 2026/27.

Queensland is the other state that has been over the NSW-based limit for assessed fiscal capacity. It was over by small amounts in 2022/23 and 2023/24 but under by a large amount in 2024/25. While the standard state system is actually applied separately to the three assessment years, here we simplify by applying it at the end of the process, in the application year. Under that simplification, 3-year averaging puts Queensland's fiscal capacity under the limit. Hence, WA is the only state to benefit from the limit in our modelling. In future years, that may generally be the case in practice as well.

Under standard state equalisation, the full equalisation transfers are calculated first, just as they are under grants equalisation. Any states that are fiscally stronger than the standard state are then treated as if this wasn't the case. In Table 8B, this NSW-based limit changes the full equalisation transfers in column (1) to the "after limit" transfers in column (2). The sole effect of this is to reduce the WA payment from $8.5 billion to $1.2 billion.

Table 8B: Standard state equalisation transfers ($ million)

	(1) base (full equalisation)	(2) after limit	(3) cost of the limit	(4)=(2)+(3) final transfer
NSW	-3,238	-3,238	-2,289	-5,527
Vic	3,599	3,599	-1,893	1,706
Qld	-1,621	-1,621	-1,518	-3,139
WA	-8,531	-1,157	-818	-1,976
SA	3,083	3,083	-504	2,578
Tas	2,030	2,030	-151	1,878
ACT	435	435	-130	305
NT	4,244	4,244	-70	4,174
Total	0	7,373	-7,373	0
Redistribution	13,390	0	0	10,641

This reduction in the WA transfer results in a funding shortfall of $7.4 billion. Similar to grants equalisation, this shortfall is funded indirectly from the pool of general revenue payments to all states, as shown in column (3) of Table 8B. The "after limit" transfers adjusted for the "cost of the limit" then determine the effective final equalisation transfers appearing in the final column.

Thus, relative to full equalisation, standard state equalisation redistributes revenue to the fiscally strongest state WA, and away from all other states. Hence, the final column of Table 8B shows all states other than WA being worse off under the standard state policy of column (4) than under the full equalisation policy of column (1). In per capita terms, the WA transfer increases by $2,099 while for the other seven states it reduces by $262.

Welfare and population effects

We now consider the effects on national economic welfare and state populations from the two donor relief schemes. The main effect of both policies, compared to full equalisation, is to reduce the equalisation payment made by WA. How this development affects consumer welfare depends on whether this policy change takes the equalisation payment by WA closer to, or further away from, its efficient level.

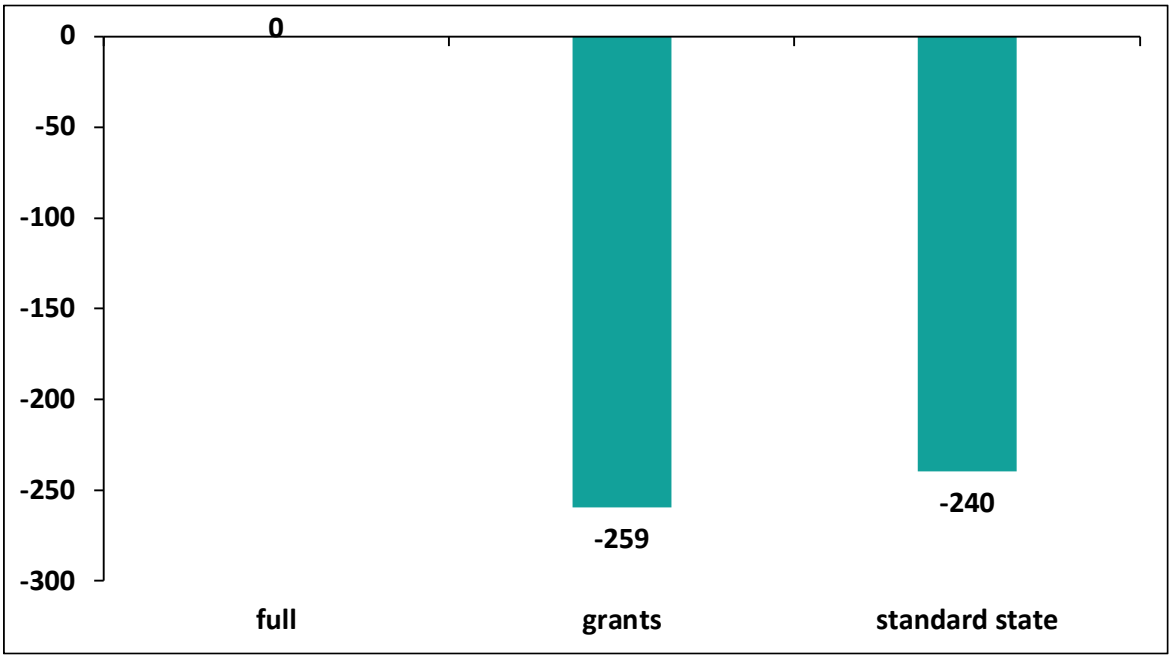
Under full equation the WA equalisation transfer is -$8,531 million (Table 3A) whereas under efficient equalisation it is -$7,570 million (Table 3B). Thus, it is efficient to reduce the WA equalisation payment by about $1.0 billion. This reduction in the WA payment is efficient because WA has a smaller fiscal advantage from residence-based taxes and expenditures when that advantage is calculated under limited equalisation than under full equalisation.

The donor relief schemes reduce the WA equalisation payment by much more than the $1.0 billion required for efficiency. Standard state equalisation reduces the WA payment by $6.6 billion while grants equalisation reduces it by $7.0 billion. These reductions result in WA transfer payments of -$1,976 million (Table 8B) and -$1,486 million (Table 8A) respectively.

These greatly oversized reductions in the WA equalisation payments take us further away from efficient equalisation, resulting in significant losses in consumer welfare compared to full equalisation. The annual losses in consumer welfare are $240 million under standard state equalisation and $259 million under grants equalisation (Chart 4). The loss under grants equalisation is larger because its reduction in the WA equalisation payment is more over-sized.

In our simulations with the stylised model, these large reductions in WA equalisation payments lead to significant decreases in the burden of residence-based taxes in WA. Under standard state equalisation the tax cut is equivalent to 1.8% of WA resident income and under grants equalisation it is 2.0% of resident income. These tax cuts could take the form of reducing payroll tax to a very low level. This would artificially attract businesses and workers to WA, making the national labour market less efficient.

Chart 4: Welfare impacts of donor relief systems
(deviations from full equalisation baseline, $m per year)



Under standard state equalisation, the resulting interstate migration is simulated, in the long term, to boost the population of WA by 7.6 per cent (Table 9), compared to full equalisation. This is at the expense of the other states which experience a uniform population loss of 0.9 per cent (Table 9).

Table 9: Population impacts of donor relief systems
(deviations from full equalisation baseline, per cent)

	grants	standard state
NSW	-0.3%	-0.9%
Vic	-1.8%	-0.9%
Qld	-0.7%	-0.9%
WA	8.1%	7.6%
SA	-1.8%	-0.9%
Tas	-1.7%	-0.9%
ACT	-1.7%	-0.9%
NT	-1.6%	-0.9%
Total	0.0%	0.0%

Under grants equalisation, the slightly deeper cut to WA residence-based taxes leads to a slightly larger boost to the population of WA of 8.1 per cent (Table 9). The other seven states and territories experience population losses in the range of 0.3 per cent to 1.8 per cent (Table 9).

Overall, standard state equalisation and grants equalisation have quite similar effects which are driven by similarly over-sized reductions in WA equalisation payments. On the one hand, standard state equalisation results in a slightly lower loss in consumer welfare of $240 million versus $259 million. On the other hand, standard state equalisation entails slightly more state

redistribution of $10,641 million (Table 8B) versus $8,399 million (Table 8A). Overall, these results suggest that the grants scheme and the standard state scheme have generally similar effects.

We can now answer the second question that was posed at the beginning of this section. This was whether the two donor relief schemes considered in 2018 were better or worse than the full equalisation scheme that was already in place. The results indicate that both proposed schemes were significantly worse, with annual welfare losses of $259 million for a grants scheme and $240 million for the standard state scheme that was actually adopted. Thus, Australians would have been permanently better off on an annual basis by $240 million if we had kept full equalisation instead of adopting the standard state scheme, which will be fully phased in from 2026/27.

5.4 Efficient equalisation

We now address the third policy question that was posed at the beginning of this section. Is efficient equalisation a material improvement on full equalisation? Full equalisation is an important benchmark because some early research found that it was efficient and it is still sometimes advocated, including in Productivity Commission (2026).

Efficient Scenario

The efficient equalisation scenario maximises consumer welfare. It was constructed using the equalisation formula derived in the Appendix and explained in section 2. The formula was implemented in sections 3 and 4, and the resulting equalisation transfers calculated in Table 3B. The efficient transfers were obtained in the final row of Table 3B and are reproduced here in Table 10.

Because it is designed to maximise consumer welfare, efficient equalisation will always lead to higher consumer welfare than under full equalisation. Before quantifying that welfare benefit, we discuss two other advantages of efficient equalisation compared to full equalisation. Those advantages are that efficient equalisation is less complex and it involves less redistribution between states.

Spahn (2007, p.47) suggests that the Australian system of full equalisation was too complex. That criticism remains pertinent today because the same complex calculations for full equalisation are made as the first step in the new Australian system of standard state equalisation. Compared to full equalisation, efficient equalisation reduces complexity by requiring fewer calculations on both the expenditure and revenue sides of state budgets.

On the expenditure side, efficient equalisation eliminates equalisation for geographic factors (population dispersion, population weighted density). It also eliminates equalisation for costs (wage costs, construction costs). This can be seen in the progression from Table 3A for full

equalisation to Table 3B for efficient equalisation. Hence, efficient equalisation requires fewer calculations on the expenditure than does full equalisation.

On the revenue side, efficient equalisation reduces complexity by replacing separate equalisation for certain residence-based taxes (payroll tax, insurance & motor taxes) with a single limited (demographic-based) equalisation. Further, this single equalisation has a broader coverage of residence-based taxes than under full equalisation. Besides the taxes covered under full equalisation, it also covers GST and "other taxes". We now discuss the equalisation of these two additional taxes in turn.

The existing system does not formally include the GST in the equalisation process[3], presumably on the grounds that it is collected by the Commonwealth Government. However, it is necessary to include the GST and treat it like other residence-based taxes for equalisation to fully support locational efficiency for labour. In any case, as Pincus (2002) points out, while the Commonwealth Government collects the GST, it distributes all of the revenue to state governments and hence "the Commonwealth acts as tax agent for each State". So, in an economic sense, the GST is, in essence, a state tax.

The existing system also does not equalise "other taxes". Gambling taxes are the main tax in this category and the CGC has not been able to develop an approach to equalising gambling taxes (CGC, 2025, p.37). Our approach of instead categorising gambling taxes as a residence-based tax and then applying limited equalisation to that broader tax category addresses this problem.

As noted above, the limited equalisation approach developed in section 4 for residence-based taxes combines all of these taxes in a single line item, as seen in Table 4. These residence-based taxes are separated into four categories in Table 5 and elsewhere only for the purpose of making comparisons with the existing equalisation system.

Because GST is collected by the central government, one complication in applying limited equalisation to it is that this requires a breakdown of collections by state. However, the Commonwealth Government only collects data according to the state in which GST returns are filed, not according to the state in which GST is paid on purchases. The two state breakdowns could be quite different because national companies may file their national collections from the state in which their head office happens to be located.

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[3] It can be argued that the GST is informally included and is fully equalised. All states make the same revenue raising effort because the GST applies uniformly across states, and so the initial state distribution of GST revenue on an equal per capita basis achieves full equalisation. However, the GST needs to be formally included in the equalisation process to apply demographic-based equalisation instead of full equalisation.

To overcome this problem, we estimate the state shares of national GST collections using a state indicator for the tax base. Specifically, we use state shares of household final consumption expenditure, because GST is mainly a consumption tax. After we have estimates for GST collections by state, we can include GST with other residence-based taxes and apply demographically-based equalisation.

Besides less complexity, another advantage of efficient equalisation is that it involves less state redistribution than under full equalisation. It involves a reduction from $13.4 billion to $10.6 billion in the value of transfers from donor states to recipient states (Table 10).

Thus, about 80 per cent of the redistribution under full equalisation remains in place under efficient equalisation. This is because most of the redistribution under full equalisation is efficient. This was noted earlier in the discussion of minimal equalisation. Efficient equalisation includes full equalisation for source-based taxes, demographic effects and the fixed costs of government.

Table 10: Baseline and efficient equalisation transfers ($ million)

	baseline (full equalisation)	efficient
NSW	-3,238	-1,367
Vic	3,599	3,873
Qld	-1,621	-1,677
WA	-8,531	-7,570
SA	3,083	2,982
Tas	2,030	1,180
ACT	435	-1
NT	4,244	2,581
Total	0	0
Redistribution	13,390	10,616

Similarly, there is no change in the identity of the donor and recipient states. Under full equalisation the significant donor states are NSW, Queensland and WA and this continues to be the case under efficient equalisation.

The main single factor driving the changes to equalisation transfers that do occur under efficient equalisation is the removal of geographic factors as a reason for equalisation. This makes NSW a smaller donor and NT and Tasmania smaller recipients.

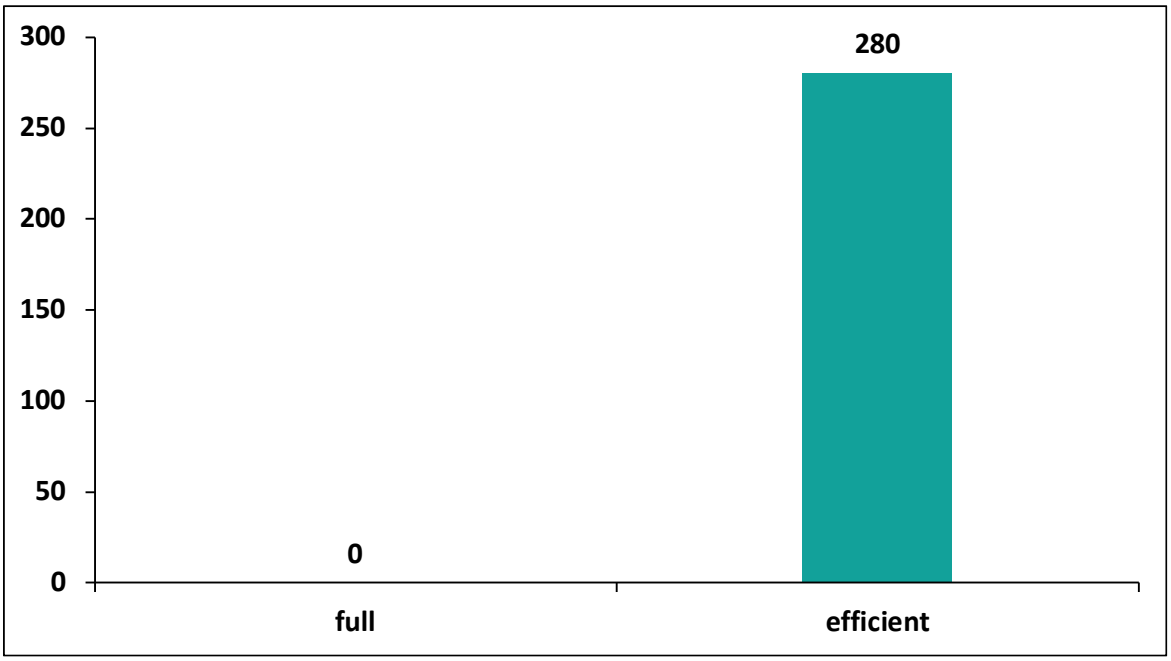
In addition, WA becomes a smaller donor under efficient equalisation because of the change from full to limited equalisation of payroll tax. Full equalisation inappropriately penalises WA for the fact that its payroll tax base outperforms what would be predicted from its demographic base. The practice of equalising for this labour market outperformance is inefficient as it blunts a market signal for interstate migration to WA.

Welfare and population effects

While efficient equalisation is less complex and involves less redistribution between states than full equalisation, its most important advantage compared to full equalisation is that it leads to higher consumer welfare. This is because it is designed to maximise consumer welfare. For that reason, it leads to higher consumer welfare than in any of the equalisation policy scenarios.

Compared to full equalisation, efficient equalisation limits equalisation of residence-based taxes and the variables costs of government spending to the effects of population composition. This results in an annual gain in consumer welfare of $280 million, as seen in Chart 5.

Chart 5: Welfare impact of efficient equalisation system
(deviations from full equalisation baseline, $m per year)



The gains in consumer welfare under efficient equalisation are likely to be shared widely. This is because efficient equalisation results in each labour type being located efficiently, which has the potential to raise the living standards of all labour types. Furthermore, the gain in living standards for a given labour type is experienced across all states. This is because, over time, the free movement of labour can be expected to achieve horizontal equity by equating living standards of any given labour type across states.

As explained above, compared to full equalisation, under efficient equalisation NSW and WA become smaller donor states and Tasmania and the NT become smaller recipient states (Table 10). These changes in equalisation transfers lead to induced changes in the burden of residence-based taxes in those states. Under efficient equalisation compared to full equalisation, the stylised model simulates small tax cuts in WA and NSW equivalent to 0.3% and 0.2% of state resident income respectively. On the other side of the coin, the tax increases in Tasmania and the NT are equivalent to 0.8% and 5.8% of state resident income respectively.

These tax changes (together with accompany changes in government services) induce interstate migration. The lower donor payments required of NSW and WA lead to modest population gains of the order of 1% (Table 11) in the long run. On the other hand, the lower receipts for Tasmania and the NT induce larger population losses in percentage terms of about 5% and 20% respectively. This is because Tasmania and the NT have relatively small populations, so a given loss of transfers in dollar terms leads to a larger loss in per capita terms.

Table 11: Population impacts of efficient equalisation system
(deviations from full equalisation baseline, per cent)

	efficient
NSW	0.8%
Vic	0.1%
Qld	-0.1%
WA	1.1%
SA	-0.2%
Tas	-5.3%
ACT	-3.3%
NT	-20.1%
Total	0.0%

Thus, some states lose residents and other states gain residents. However, in the long-term labour mobility ensures that the residents of all states will share in the boost to living standards for a given type of labour.

We now can answer the third policy question posed at the beginning of this section, namely whether the welfare gain from moving from full equalisation to efficient equalisation is material. The annual welfare gain of $280 million is small compared to GDP, at 0.1%.

However, the appropriate way of assessing whether the welfare gain is material is relative to the size of the policy. Moving from full to efficient equalisation actually reduces the size of the equalisation policy, from redistributing $13.4 billion to $10.6 billion (Table 10). When a smaller policy intervention produces a larger benefit it is unambiguously a good idea. Further, efficient equalisation has the additional advantage of being less complex than full equalisation.

A related question is whether it is worth having an equalisation scheme at all, even if it is efficient. To answer that question, we need to compare the effects of efficient and minimal equalisation. The results we have so far compare both policies to full equalisation. Compared to full equalisation, efficient equalisation produces an annual welfare gain of $280 million (Chart 5), while minimal equalisation results in a welfare loss of $921 million (Chart 3). Taking the difference between these two results, the gain in consumer welfare from efficient equalisation compared to minimal equalisation is $1,201 million.

This welfare gain entails expanding the size of equalisation transfers between states from $4.3 billion (Table 6) to $8.3 billion (Table 10), an increase of $4.0 billion. Of course, this increase

refers to transfers between states, not economic costs. Thus, the welfare gain represents a substantial 29 cents in the dollar for the increase in inter-state transfers.

5.5 Partial equalisation

We now address the fourth policy question that was posed at the beginning of this section. Can partial equalisation provide most of the benefits of efficient equalisation?

Essentially, efficient equalisation modifies full equalisation by retaining the efficient types of equalisation and removing the inefficient types. Hence there is less redistribution, with the total amount of redistribution falling from $13.4 billion to $10.6 billion, as noted above.

Suppose there is policy inertia such that it is not feasible to eliminate any existing forms of equalisation. In that case, a potential second-best way of reducing the total amount of redistribution is by applying a uniform discount to the redistribution under full equalisation, resulting in partial equalisation. Here we find the uniform percentage discount that maximises welfare.

We quarantine two areas from the discount. First, we retain full equalisation for indigeneity for consistency with all of the other scenarios, including the minimal equalisation scenario. We also retain full equalisation for specific purpose payments to the states, so that those payments continue to be treated in the same way as general revenue payments to the states for the purposes of equalisation.

We simulate possible uniform discount rates in increments of 5 percentage points. The highest welfare outcome is achieved with a discount of 30 per cent. This gives us our partial equalisation scenario of 70 per cent of full equalisation.

This partial equalisation policy is a viable alternative to efficient equalisation if it can provide most of the same benefits, relative to full equalisation. The equalisation transfers under the three equalisation policies are shown in Table 12. The transfers under partial equalisation were calculated in Table 3C.

The first advantage of efficient equalisation is that, by eliminating some forms of equalisation, it makes the equalisation process simpler than under full equalisation. Partial equalisation does not share that benefit because it retains all of the forms of equalisation that are used under full equalisation, with the additional step of applying a discount.

The second advantage of efficient equalisation is that it reduces the amount of redistribution from donor to recipient states compared to full equalisation. Partial equalisation also has this advantage. Efficient equalisation reduces the amount of redistribution from $13.4 billion to $10.6 billion and partial equalisation reduces this further to $9.0 billion (Table 12).

Table 12: Full and partial equalisation transfers ($ million)

	baseline (full equalisation)	efficient	70% full
NSW	-3,238	-1,367	-1,903
Vic	3,599	3,873	1,982
Qld	-1,621	-1,677	-1,005
WA	-8,531	-7,570	-6,139
SA	3,083	2,982	2,069
Tas	2,030	1,180	1,437
ACT	435	-1	302
NT	4,244	2,581	3,256
Total	0	0	0
Redistribution	13,390	10,616	9,046

Note:

As noted in the text, the transfers in the 70% full column are not exactly 70% of the transfers in the full column because transfers for other Commonwealth payments and indigeneity are excluded from the 30% discount.

Welfare and population effects

The most important advantage of efficient equalisation is that it raises annual consumer welfare, compared to full equalisation, by $280 million. Achieving a welfare gain from partial equalisation depends on the resulting transfers being closer to the efficient transfers than is the case under full equalisation transfer.

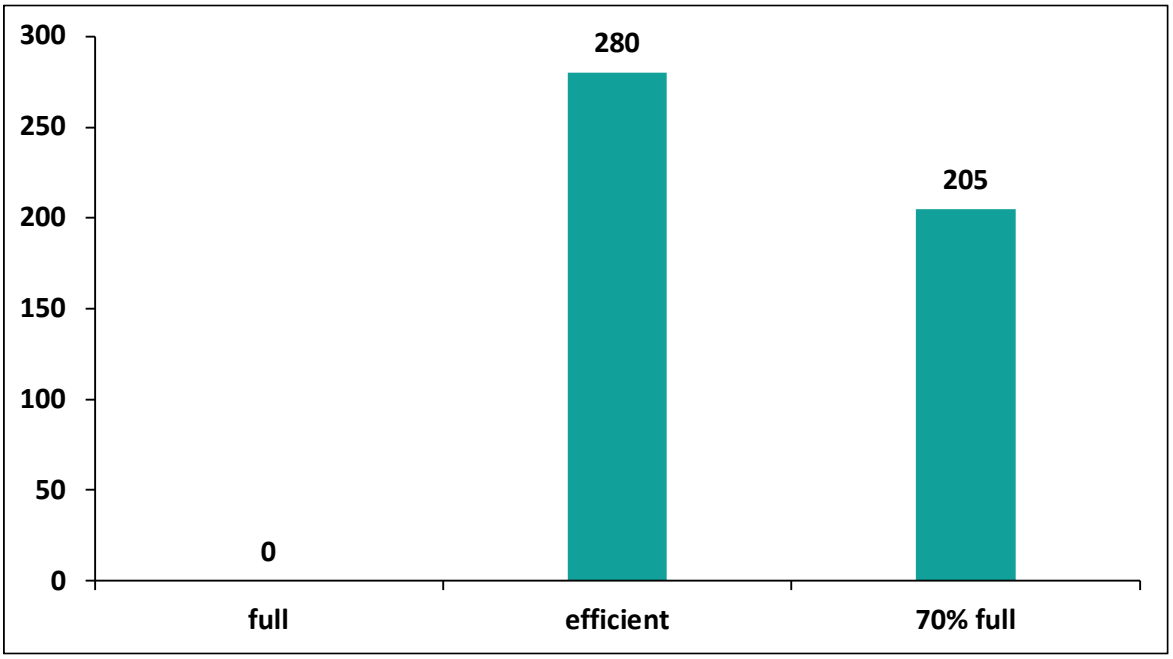
This closeness in transfers is helped if the state patterns of efficient and inefficient transfers are similar. In that case, it would not matter so much for welfare if all transfers are reduced, as under partial equalisation, rather than inefficient transfers are removed, as under efficient equalisation.

In practice, there is some correlation in the state pattern of efficient and inefficient transfers. For example, the NT receives an inefficient transfer of $1,766 million for population dispersion as well as an efficient transfer of $1,524 million for indigenous status. So, the NT transfer can be reduced to a more efficient level by either removing the inefficient transfers under efficient equalisation or by applying a uniform discount to all transfers under partial equalisation.

In practice, taking all drivers into account, partial equalisation reduces the NT transfer from $4,244 million to $3,256 million, while the efficient transfer is lower still, at $2,581 million (Table 12). Thus, in the case of the NT, partial equalisation improves efficiency, but of course not to the full extent possible, as under efficient equalisation. Partial equalisation also moves transfers closer to the efficient levels in the cases of NSW, Tasmania and the ACT.

Overall, compared to efficient equalisation, partial equalisation reduces the welfare gain from $280 million to $205 million, as seen in Chart 6.

Chart 6: Welfare impacts of efficient and partial equalisation systems
(deviations from full equalisation baseline, $m per year)



Similarly, partial equalisation also results in a generally comparable pattern of effects on states populations, compared to efficient equalisation. In both cases, WA and NSW experience population gains, while the NT and Tasmania experience population losses (Table 13). Thus, partial equalisation achieves some of the improvement in locational efficiency of labour that is achieved to its full potential under efficient equalisation.

Table 13: Population impacts of efficient and partial equalisation systems
(deviations from full equalisation baseline, per cent)

	efficient	70% full
NSW	0.8%	0.6%
Vic	0.1%	-0.8%
Qld	-0.1%	0.4%
WA	1.1%	2.8%
SA	-0.2%	-2.0%
Tas	-5.3%	-3.8%
ACT	-3.3%	-1.0%
NT	-20.1%	-13.1%
Total	0.0%	0.0%

We now can answer the fourth and final policy question posed at the beginning of this section. Can partial equalisation provide most of the benefits of efficient equalisation? The answer is a qualified yes. The gain in annual consumer welfare of $205 million represents most of the gain under efficient equalisation of $280 million. However, while efficient equalisation makes the equalisation process simpler, partial equalisation makes it a little more complex because of the need to apply equalisation rates, as was seen in Table 3C. Finally, partial equalisation, like efficient equalisation, requires a lower total level of equalisation transfers between the states.

6 QUALIFICATIONS

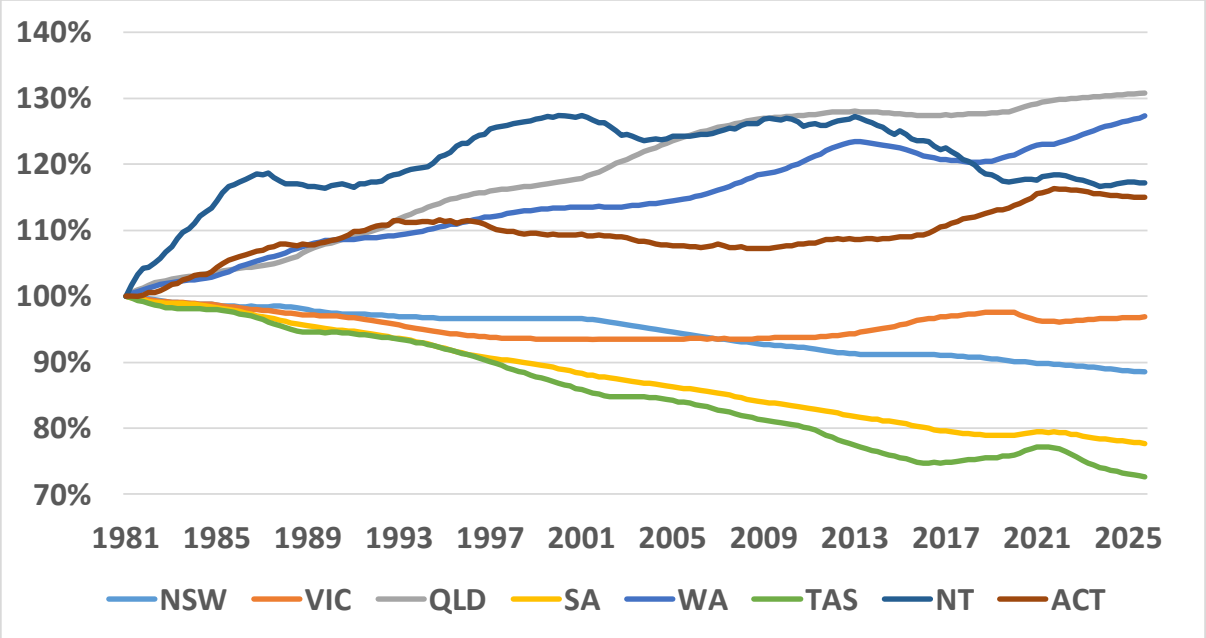
This section discusses six qualifications to our theoretical model, and therefore to the associated empirical analysis.

First, following Boadway and Flatters (1982) and Albouy (2012), the modelling treats the national supplies of labour and capital as fixed. This would not be reasonable in national analysis of the efficiency of taxes on labour and capital. However, for fiscal equalisation, the key issue is achieving labour locational efficiency between states, rather than efficiency in the national labour supply. That is, fiscal equalisation is about regional economics.

Second, we also assume that labour is perfectly mobile between states. Albouy (2012) points out that "mobility makes the most sense in a long run setting: when mobility costs are amortised over longer periods, they become small relative to the potential gains of moving". He adds: "the conclusions below may hold even when some households are immobile, so long as there is a sufficiently large number of mobile households of each type".

Similarly, the historical evidence suggests that in Australia there has been a high degree of interstate labour mobility achieved over time. This mobility has involved a combination of interstate migration and state selection of settlement by arriving immigrants. Compared to a scenario in which state shares of the national population had remained fixed, Chart 7 shows that since 1981 the population of Queensland and Western Australia have risen by about 30 per cent, while the populations of South Australia and Tasmania have both fallen by about 25 per cent. Indeed, the population of Queensland relative to Tasmania has risen by 80 per cent. Compared to these population shifts, population movements shown in Table 11 for the efficient equalisation scenario are relatively small, and might plausibly be achieved in around a decade. The long-run changes in state populations are 5 per cent or less, except in the case of the NT.

Chart 7: State population relativities (1981=100%)



Third, again following Boadway and Flatters (1982) and Albouy (2012), the modelling implicitly assumes that state governments take their equalisation grants as given. However, the spending and tax behaviour of a state government does have some impact on the equalisation grant that it receives in Australia, as emphasised by Petchey (2011). For example, when a state government unilaterally raises a tax, for each additional dollar of revenue that it receives directly, its equalisation grant is adjusted by a fraction of a dollar. As shown by the full equalisation formula of equation [36] in section 4, that fraction is equal to the difference between the state's share of the population and its share of the tax base. That fraction can be positive or negative and generally, although not always, is rather small. Further, there is a lack of empirical evidence that its existence influences state government behaviour.

Fourth, this paper assumes that state government services are private in nature, meaning that there is no fiscal externality from the provision of public goods. This is consistent with the literature assessments of both Boadway and Flatters (1982) and Albouy (2012) that state government services are private to a close approximation. This reflects the private nature of the major state government services such as school education and hospital care as distinct from the public nature of central government services such as defence.

Fifth, congestion is not taken into account, even though it may be affected by interstate population shifts. However, fiscal equalisation is not an efficient method of addressing negative externalities from congestion. An individual moving from Adelaide in SA to Sydney in NSW may increase congestion, but the same individual moving to Bourke in NSW would not. These two cases cannot be distinguished if congestion is addressed in a crude way through adjustments to equalisation payments. The efficient way of addressing congestion is through congestion policies that are specific to the location of the congestion. Thus, congestion is best viewed as an issue for congestion policy rather than an issue for fiscal equalisation.

Sixth, in analysing fiscal equalisation, this paper models locational distortions caused by state government budgets, including those generated by central government grants to the states, both general purpose and special purpose. However, we do not model the central government personal income tax, even though Albouy (2009, 2012) shows that it distorts location decisions.

This location distortion from federal income tax arises because tax payments are based on nominal incomes whereas location decisions are based on amenity-adjusted real incomes. For example, mining workers receive a wage premium for working in remote areas merely to compensate for low amenity and high living costs. Yet the wage premium is taxed, which acts as a disincentive to take up such jobs.

The best way of tackling this location distortion would be by altering the personal income tax system. Fiscal equalisation would be a blunt instrument to use. Perhaps for that reason, the equalisation literature generally focusses mainly on state government budgets.

7 PROPOSAL

This paper develops a proposal for an efficient equalisation system, which has general applicability for federations. Under this approach, vertical equity objectives continue to be achieved through redistributive policies incorporated in government budgets at both the federal and state levels. The role of fiscal equalisation is to establish an efficient connection *at the margin* between the cost of state government services and the charging of a state's residents for those services through residence-based taxes such as those on labour income or consumption.

Because this system is efficient, compared to other equalisation systems, it promotes a more efficient locational distribution of labour, generating higher living standards across all states. This involves full equalisation for the fixed costs of state government and for source-based taxes on natural resources and land. However, equalisation is limited to the influences of the composition and level of the population for the variable costs of state government, residence-based taxes on factor incomes and consumption taxes.

In Australia, there was full equalisation until 2020/21 followed by a transition to standard state equalisation that will be complete in 2026/27. This paper finds that the switch to standard state equalisation was a mistake, because it has resulted in a welfare loss that is estimated at $240 million in 2026/27. Standard state equalisation has created the circumstances where WA can afford to abolish payroll tax, making it a tax haven likely to induce inefficient inward migration from other states.

To implement our proposal, the first step is to correct this mistake by reverting from standard state equalisation to full equalisation. This is straightforward because standard state equalisation involves first making the calculations for full equalisation and then making adjustments. Thus, we can revert to full equalisation simply by removing those standard state adjustments.

The second step in implementing our proposal is to switch from full equalisation to efficient equalisation to maximise welfare. The paper finds that this would result in a further welfare gain of $280 million on an annual basis. Further, it reduces the amount of redistribution between states from $13.4 billion to $10.6 billion, making it a smaller policy intervention. This involves varying the existing system of full equalisation in the following ways on the revenue and expenditure sides of state budgets.

7.1 Revenue

1. Efficient equalisation retains full equalisation for source-based taxes, namely mining royalties, stamp duties on conveyances and land tax. Full equalisation is efficient for these source-based taxes because they can be used to raise revenue from non-residents. Without full equalisation, states with greater ability to tax non-residents could establish a tax haven for residents, inefficiently drawing businesses and labour from other states with higher productivity. At the same time, ideally the existing equalisation system based

on mining production would be adjusted to control for any differences between state governments in their willingness to convert mining capacity into mining production.

2. Efficient equalisation replaces the initial population-based state distribution of national GST revenue with a household consumption-based state distribution. Because GST is a consumption-based tax, this change brings GST into line with other taxes, where the starting point for equalisation is the amount of revenue raised in each state.

3. Under efficient equalisation, for residence-based taxes including GST, payroll tax, insurance taxes, motor taxes and gambling taxes, limited equalisation is adopted. This involves isolating differences in revenue-raising capacity that arise from differences in state population compositions and levels, and only equalising for those. This method has been demonstrated in this paper using labour types that are cross-classified by age, indigenous status and educational attainment. Unlike the existing equalisation system, this method avoids inefficiently equalising for differences between states in the productivity of the same type of labour.

7.2 Spending

1. Efficient equalisation retains full equalisation for administrative scale. This is so the fixed costs of state government are shared nationally on an equal per capita basis. This is to avoid fixed costs becoming a disproportionate burden on the budgets of less populous states and thus distorting state locational choices for labour at the margin.

2. Efficient equalisation retains full equalisation for demographic-based characteristics, such as indigenous status and age. This is so the costs of fiscally-needy groups such as the indigenous are shared nationally, and so again do not distort state locational choices for labour at the margin.

3. Efficient equalisation removes equalisation for geographic circumstances. This supports efficient provision of state government services by exposing state residents to the true cost of providing services in their own states.

4. Efficient equalisation also removes equalisation for wage and construction costs. Differences between states in wages for the same type of labour are a market signal for interstate migration that should not be dulled by equalisation.

The efficient equalisation system significantly simplifies the existing full equalisation system and generates a gain in annual consumer welfare estimated at $280 million in 2026/27, as noted above. This gain is spread across residents of all states and territories.

To a considerable extent, the role of the efficient equalisation scheme is to compensate for some shortcomings in the assignment of fiscal responsibilities in the Australian Federation. If the Federal Government had the right to raise source-based taxes, such as mining royalties and land taxes, offset by a right for state governments to raise a residence-based tax through partial

access to personal income tax, per capita revenue raising capacities would be much more equal between states. Similarly, if the Federal Government were responsible for indigenous affairs, and state boundaries were re-drawn so that state populations were more equal (reducing the significance of administrative scale as an equalisation factor), per capita expenditure needs would also be more equal.

In these hypothetical circumstances, there would be a much-diminished role for efficient fiscal equalisation. In the meantime, efficient equalisation can play the useful role of providing a backstop for some shortcomings in the design of the Australian Federation.

Finally, as a second-best policy to efficient equalisation, we estimate the best rate of partial equalisation, which turns out to be 70 per cent. This policy of 70 per cent of full equalisation generates a significant annual welfare gain of $205 million, although not as large as the gain under efficient equalisation of $280 million. Also, unlike efficient equalisation, partial equalisation does not simplify the equalisation system.

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APPENDIX. THEORETICAL DERIVATION

The first aim of this paper is to develop a theoretical model of fiscal equalisation and use that model to derive an efficient fiscal equalisation formula that has general applicability for federations. Section 2 provides a general explanation of the model and associated formula, while this Appendix provides the full theoretical analysis.

A.1 Model

The model set out here draws heavily on Albouy (2012) and the final model of Boadway and Flatters (1982).

An individual with labour of type *e* lives in state *j* and consumes a private consumption good *c* and state government services *g*, which are assumed to be publicly-provided, private goods. Both of these consumption goods are produced from an intermediate good, *y*, which serves as the numeraire. Productivity in transforming the intermediate good into the two consumption goods can differ between states so the prices of *c* and *g* may also differ between states. That is, *PC* and *PG* refer to the number of units of the intermediate good needed to produce a unit of the private and government goods respectively. The individual's income, y, is measured in units of the intermediate good. Thus, the individual's budget constraint is as follows.

$$y_e^j = PC^j c_e^j + PG^j g_e^j \quad [1]$$

The individual's indirect utility depends on prices of the two consumption goods, *PC* and *PG*, income, *y*, and the consumer amenity, *Q*, of the state in which they live. Hence the indirect utility function, *V*, takes the following form.

$$V_e = V_e(PC^j, PG^j, y_e^j, Q_e^j) \quad [2]$$

Under the long-run assumption of perfect mobility of each labour type, utility is the same irrespective of the state in which a member of a labour type lives, so indirect utility only varies between labour types.

In each state, capital *K*, land *L* (which can also refer to natural resources) and each type of labour $\boldsymbol{N}$ are combined to produce the intermediate good. Part of this output is used to cover the fixed costs of the state government, *GF*, while the remainder is available for satisfying consumer wants. In the national income constraint, the available income for allocating across all labour types in all states is equal to the total across states of the production of the intermediate good net of the fixed cost of providing the government good.

$$\sum_j \sum_e N_e^j y_e^j = \sum_j \left\{ F^j\left(K^j, L^j, \boldsymbol{N}^j\right) - PG^j GF \right\} \quad [3]$$

The supply of land in each state is taken as given. The supplies of capital and each type of labour are taken as given at the national level, but these factors are both perfectly mobile between states, leading to the following constraints.

$$K = \sum_j K^j \quad [4]$$

$$\boldsymbol{N} = \sum_j \boldsymbol{N}^j \quad [5]$$

A benevolent planner aims to maximise social welfare. This includes achieving Pareto efficiency. For that purpose, a Lagrangian is formed in which the utility of one type of individual, that of type 1, is maximised while holding the utility of all other types fixed and taking into account the constraints of equations [2], [3], [4] and [5].

$$\mathcal{L}() = V_1 + \sum_j \sum_e \eta_e^j \left[V_e - V_e\left(PC^j, PG^j, y_e^j, Q_e^j\right)\right] + \pi\left[\sum_j \sum_e N_e^j y_e^j - \sum_j\left\{F^j\left(K^j, L^j, \boldsymbol{N}^j\right) - PG^j GF\right\}\right] + \kappa\left[K - \sum_j K^j\right] + \sum_e \nu_e \left[N_e - \sum_j N_e^j\right] \quad [6]$$

Putting aside the constraints themselves, there are four sets of first order conditions.

$$\frac{\partial \mathcal{L}}{\partial V_1} = 0 \quad [7]$$

$$\frac{\partial \mathcal{L}}{\partial y_e^j} = 0 \quad [8]$$

$$\frac{\partial \mathcal{L}}{\partial K^j} = 0 \quad [9]$$

$$\frac{\partial \mathcal{L}}{\partial N_e^j} = 0 \quad [10]$$

Evaluating these derivatives and re-arranging gives the following conditions.

$$\sum_j \eta_1^j = -1 \quad [11]$$

$$\pi = \frac{\eta_e^j \frac{\partial V_e}{\partial y_e^j}}{N_e^j} \quad [12]$$

$$\kappa = -\pi \frac{\partial F^j}{\partial K^j} \quad [13]$$

$$\nu_e = \pi\left(y_e^j - \frac{\partial F^j}{\partial N_e^j}\right) \quad [14]$$

As Albouy (2012, p. 836) notes, equations [13] and [14] for the efficient allocations of capital and labour respectively, 'are the most interesting conditions' for the purposes of fiscal

equalisation. Assuming producers maximise profits and operate under perfect competition, the marginal products appearing in these two equations will be equated with the tax-inclusive factor prices facing producers. This is taken into account in moving from equations [13] and [14] to equations [13]' and [14]'.

$$i^j = -\frac{\kappa}{\pi} \qquad [13]'$$

$$y_e^j - w_e^j = \frac{v_e}{\pi} \qquad [14]'$$

In these equations, the tax-inclusive factor prices are represented by the rental price of capital, *i*, which is state-specific, and the wage, *w*, which is both state and labour type specific.

Consider the allocation of capital across states.

On the supply side, if there is a source-based tax on capital at the rate *tK*, such as a corporate tax, capital owners will arbitrage between states until post-tax returns are uniform.

$$\left(1 - tK^j\right)i^j = \left(1 - tK^{j'}\right)i^{j'}$$

Hence, capital owners will require a pre-tax rate of return in state j' of the following.

$$i^{j'} = \frac{1 - tK^j}{1 - tK^{j'}} i^j$$

On the demand side, equation [13]' implies that tax-inclusive factor prices must be the same in each state for a Pareto efficient allocation of capital. This is so that the marginal product of capital is the same in each state.

$$i^{j'} = i^j$$

Evidently, this uniform pre-tax rate of return across states will only satisfy capital owners if the rate of corporate tax is also uniform.

$$tK^{j'} = tK^j$$

This uniformity condition holds in Australia because only the central government can impose corporate tax. However, in some other federations, including the USA, Canada, Germany and Switzerland, both national and subnational governments can impose corporate tax, so that combined rates of corporate tax can vary between regions.

In any case, we abstract from the potential distortion to the location of capital by assuming below that the rate of corporate tax, *tK*, is uniform across states. This simplifying assumption

makes Pareto efficiency possible, which is useful in deriving a rule for efficient fiscal equalisation.

Now consider the allocation of labour across states. This time we begin with the demand side of the market.

Equation [14]' implies that, for labour to be efficiently allocated across states, each state must offer the same type of labour the same non-labour income, *y*-*w*. This is so location decisions for each labour type are influenced by the signal for the marginal product of labour provided by the tax-inclusive wage, *w*, but not by any signal from non-labour income, *y*-*w*.

Turning to the supply side of the labour market, in the long run labour mobility ensures that utility is the same in all states for a given labour type, as was seen in equation [2], which is reproduced below for ease of reference.

$$V_e = V_e(PC^j, PG^j, y_e^j, Q_e^j) \qquad [2]$$

We now apply the condition for a Pareto efficient allocation of labour given by equation [14]' to eliminate full income.

$$V_e = V_e(PC^j, PG^j, w_e^j + \frac{v_e}{\pi}, Q_e^j)$$

This equation shows how, under Pareto efficiency, the equilibrium wage will vary between states for a given labour type. The wage, *w*, will be higher to compensate for a higher cost of living captured by *PC* and *PG* or a lower level of amenity captured by *Q*, where *PC*, *PG* and *Q* are all exogenous to the model.

Given that each state must offer the same type of labour the same level of non-labour income for Pareto efficiency, the next step is to determine that level. This simply requires setting the level in each state equal to the national level, as in equation [15].

$$y_e^j - w_e^j = \frac{\sum_j N_e^j y_e^j}{N_e} - \frac{\sum_j N_e^j w_e^j}{N_e} \qquad [15]$$

This condition for the efficient allocation of each type of labour across states is at the core of deriving the welfare-maximising formula for fiscal equalisation. To apply the condition, we need to identify the components of non-labour income both for the individual in a particular state and for the national average for that type of individual. This involves considering the central government and state government budget constraints.

The treatment of the central government is rudimentary because the focus of the model is equalisation policy for state budgets. In the model, the central government budget is made up

of two types of transfers. The first is redistributive transfers aimed at achieving vertical equity. These transfers, *tr*, vary according to the type of individual.

$$\sum_e N_e \, tr_e = 0 \qquad [16]$$

The second is fiscal equalisation transfers. These transfers, *fe*, vary according to state and are paid to state governments on a per capita basis.

$$\sum_j N^j \, fe^j = 0 \qquad [17]$$

The central government is not assumed to make transfers that differentiate simultaneously between labour type and state of residence. Such transfers are unconstitutional in some Federations, including in the Australian Federation. Instead, we allow state governments to make such transfers, *str*, in the modelling below of state budgets.

Thus, we distinguish a total of three types of government transfers. They are the redistributive and fiscal equalisation transfers of the central government and the redistributive transfers of state governments. This helps explain apparent differences in the equalisation findings of Albouy (2012) and this paper, as we shall see.

The modelling of state government budgets is more involved than the modelling of the central government budget.

$$PG^j \left[GF + \sum_e N_e^j \, g_e^j\right] + str^j = N^j \, fe^j + tL^j r^j L^j + tK \, i^j K^j + tw^j \sum_e w_e^j \, N_e^j + tc^j \, PC^j \sum_e N_e^j \, c_e^j + tI^j \sum_e \frac{N_e^j}{N_e} \, \theta_e \sum_j (1 - tK) \, i^j K^j + tR^j \sum_e \frac{N_e^j}{N_e} \, \theta_e \sum_j \left(1 - tL^j\right) r^j L^j \qquad [18]$$

The left-hand side shows state government expenditures. We extend the models of Boadway and Flatters (1982) and Albouy (2012) by taking into account that some costs of state government services are fixed, namely the costs in establishing and maintaining an administrative structure, *GF*. Under the Australian system of fiscal equalisation, this is referred to as the costs of achieving administrative scale. The remaining costs of producing state government services are variable.

State government expenditures also include provision for the redistributive transfers introduced above, *str*. These play a relatively minor role because the central government can redistribute between labour types using its redistributive transfers and between states using its fiscal equalisation transfers. The role of state redistributive transfers is only to ensure that each state budget is equally progressive. As discussed at the end of this Appendix, state redistributive transfers have a zero net cost to each state budget provided a system of efficient fiscal equalisation transfers is in place.

$$str^j = \sum_e N_e^j str_e^j = 0 \qquad [19]$$

The right-hand side of equation [18] shows state government revenues. The first term is the fiscal equalisation transfer from the central government that was introduced above. The second and third terms follow Boadway and Flatters (1982) and Albouy (2012) in allowing for source-based taxes on land and capital at the rates *tl* and *tK* respectively. As noted above, we differ in assuming that the source-based tax on capital is applied at a uniform rate across states.

The fourth term follows the two earlier studies by allowing for a residence-based tax on labour income at the rate *tw*. In the fifth term we extend the earlier studies by allowing for another residence-based tax, a state consumption tax at the rate *tc*. Boadway and Flatters (1982, p. 624) flagged that they could have introduced the Canadian general retail sales tax into their model, and it would have been equivalent in effect to a uniform income tax. In our case it is important to explicitly include a consumption tax because of the central role of the GST in the Australian system of fiscal equalisation.

The remaining two terms follow Albouy (2012) by allowing for residence-based taxes on capital and land incomes at the rates *tI* and *tR* respectively. This also follows Boadway and Flatters (1982) except that they assumed that both of these forms of property income are taxed at the same rate.

Because individuals are assumed to own a share of national assets, the nature of the tax base for residence-based taxes on land and capital is the same for each state. Each group of individuals is assumed to own a fixed share θ_e of the national stocks of capital and land, with these shares summing to unity.

Having established the national, central government and state government budget constraints, the budget constraint facing each individual can be inferred.

$$y_e^j = tr_e + w_e^j + \frac{\theta_e}{N_e}\sum_j (1 - tK)\, i^j K^j + \frac{\theta_e}{N_e}\sum_j \left(1 - tL^j\right) r^j L^j + nfb_e^j \qquad [20]$$

On the left-hand side of equation [20] is the full income of the individual, *y*. Once it is determined, it is available to be spent on *c* and *g* according to equation [1]. The state government is assumed to optimally choose the level of *g* leaving the individual to consume *c* from the remaining income. The level of *g* that is chosen by the state government is assumed to be that which leaves each individual with the utility maximising combination of *c* and *g*, given *y* and the other determinants of indirect utility in equation [2].

On the right-had side of equation [20] is the sources of the individual's full income. These include its transfer from the central government, its labour income, and its capital and land income, net of taxes that have been deducted at the source. It also includes a net fiscal benefit from the state government of *nfb*, which is defined in equation [21].

$$nfb_e^j = str_e^j + PG^j g_e^j - tc^j PC^j c_e^j - tw^j w_e^j - tI^j \frac{\theta_e}{N_e} \sum_j (1 - tK) i^j K^j - tR^j \frac{\theta_e}{N_e} \sum_j \left(1 - tL^j\right) r^j L^j \quad [21]$$

The net fiscal benefit from the state government consists of the value of state government transfers and government services, net of payments of each of the four state residence-based taxes.

We can now return to equation [15], the key condition for obtaining an efficient allocation of labour across states. The left hand-side refers to an individual's non-labour income. The components of this can now be identified by re-arranging equation [20].

$$y_e^j - w_e^j = tr_e + \frac{\theta_e}{N_e} \sum_j (1 - tK) i^j K^j + \frac{\theta_e}{N_e} \sum_j \left(1 - tL^j\right) r^j L^j + nfb_e^j \quad [22]$$

The right-hand side of equation [15] refers to the national average non-labour income for the same type of individual. This can be obtained by multiplying equation [22] by the number of individuals of that type in that state, aggregating over states and then dividing by the number of individuals of that type. This gives equation [23].

$$\frac{\sum_j N_e^j y_e^j}{N_e} - \frac{\sum_j N_e^j w_e^j}{N_e} = tr_e + \frac{\theta_e}{N_e} \sum_j (1 - tK) i^j K^j + \frac{\theta_e}{N_e} \sum_j \left(1 - tL^j\right) r^j L^j + \frac{1}{N_e} \sum_j N_e^j nfb_e^j \quad [23]$$

The efficient allocation of labour depends on equality between the components of the individual's non-labour income shown on the right-hand side of equation [22] with the corresponding components for the national average for that type of individual shown on the right-hand side of equation [23]. As seen in equation [23], there are three components of non-labour income in the model, any of which could potentially led to distortions in the allocation of labour between states.

The first component is central government transfers (positive and negative) designed to achieve vertical equity. These match in the two equations. As noted above, the amount of central government redistributive transfers, tr_e, depends only on the type of individual, not their location. Thus, the central government's transfer payments do not distort the location of any type of individual.

The second component is property income, including rental income from both capital and land. These components also match because individuals of a given type are assumed to own the same portfolio of national assets irrespective of their state of residence.

The third component is the net fiscal benefit. Comparing the two equations, the condition required for an efficient allocation of labour across states is as follows.

$$nfb_e^j = \frac{1}{N_e} \sum_j N_e^j nfb_e^j = \overline{nfb}_e \quad [24]$$

This is the requirement for locational efficiency in which each state offers the same type of individual the same net fiscal benefit. There are two aspects to achieving this. First, the central government needs to arrange fiscal equalisation transfers, *fe*, that leave each state funded to provide the same levels of net fiscal benefits, nfb_e. Second, each state government needs to arrange redistributive transfers, *str*, to ensure that it uses that funding such that net fiscal benefits across labour types follow the national pattern.

A.2 Efficient Equalisation Formula

The first step in deriving the equalisation formula is to re-express the state government budget constraint of equation [18] by substituting in for the net fiscal benefit given by equation [21] and the optimality condition for the net fiscal benefit given by equation [24].

$$\sum_e N_e^j \overline{nfb}_e + PG^j GF = N^j fe^j + tL^j r^j L^j + tK\, i^j K^j \quad [25]$$

The second step is to aggregate this state government budget constraint over states to obtain the national version.

$$\sum_e N_e \overline{nfb}_e + GF \sum_j PG^j = \sum_j N^j fe^j + \sum_j tL^j r^j L^j + \sum_j tK\, i^j K^j$$

We then simplify by using the fact that, in equation [17], the fiscal equalisation transfers sum to zero.

$$\sum_e N_e \overline{nfb}_e + GF \sum_j PG^j = \sum_j tL^j r^j L^j + \sum_j tK\, i^j K^j \quad [26]$$

We now convert both the state and national versions of the state government budget constraint to the per capita form.

$$\sum_e \left(N_e^j / N^j\right) nfb_e + PG^j GF/N^j = fe^j + tL^j r^j L^j/N^j + tK\, i^j K^j/N^j \quad [27]$$

$$\sum_e (N_e/N) \overline{nfb}_e + GF \sum_j PG^j/N = \sum_j tL^j r^j L^j/N + \sum_j tK\, i^j K^j/N \quad [28]$$

Next, we subtract the national version of the constraint from the state version and re-arrange to obtain the efficient fiscal equalisation transfers expressed on a per capita basis.

$$fe^j = GF\left[PG^j/N^j - \sum_j PG^j/N\right] - \left[tL^j r^j L^j/N^j - \sum_j tL^j r^j L^j/N\right] - \left[tK\, i^j K^j/N^j - \sum_j tK\, i^j K^j/N\right] + \sum_e \left(N_e^j/N^j - N_e/N\right) \overline{nfb}_e \quad [29]$$

The above equalisation formula involves the national average for the net fiscal benefit of a type *e* individual, nfb_e. This national average is constructed in equation [30] using equation [21]. In this process, equation [19] is used to set the national average for state redistributive transfers for a given labour type to zero.

$$\overline{nfb_e} = \frac{1}{N_e}\left\{\begin{array}{c} \sum_j PG^j N_e^j g_e^j - \sum_j tc^j PC^j N_e^j c_e^j \; - \sum_j tw^j N_e^j w_e^j \\ -\theta_e \; \sum_j \frac{N_e^j \, tI^j}{N_e} \sum_k (1 - tK)\, i^k K^k \; - \; \theta_e \; \sum_j \frac{N_e^j \, tR^j}{N_e} \sum_k (1 - tL^k)\, r^k L^k \end{array}\right\} \qquad [30]$$

The efficient equalisation scheme given by equations [29] and [30] is interpreted in section 2.

This equalisation scheme leaves each state funded to provide the same levels of net fiscal benefits, nfb_e. However, for Pareto efficiency, each state government needs to arrange redistributive transfers, *str*, to ensure that it uses that funding such that net fiscal benefits across labour types follow the national pattern.

To calculate the amount of the required state redistributive transfers, the first step it to take equation [21] that defines the state net fiscal benefit for each labour type and set that benefit equal to the national benchmark. We then rearrange that equation to obtain the state redistributive transfers.

$$str_e^j = \overline{nfb_e} - \left\{PG^j g_e^j - \; tc^j \; PC^j c_e^j - tw^j w_e^j - \; tI^j \frac{\theta_e}{N_e} \sum_j (1 - tK)\, i^j K^j - tR^j \frac{\theta_e}{N_e} \sum_j \left(1 - tL^j\right) r^j L^j\right\} \qquad [31]$$

State redistributive transfers have a zero net cost to each state budget, as was shown earlier in equation [19], which is reproduced below. This is because the fiscal equalisation transfers, fe^j, mean that each state is funded to offer the same labour type the same nominal net fiscal benefit.

$$str^j = \sum_e \; N_e^j str_e^j = 0 \qquad [19]$$

Furthermore, state redistributive transfers do not change the distribution of income between labour types at the national level. This is because the central government flexibly redistributes between labour types at the national level using its own transfers, tr_e.

$$str_e = \sum_j \; N_e^j str_e^j = 0 \qquad [32]$$

This raises the issue of whether these state redistributive transfers that are called for by the theory are likely to be material in practice. Most of the redistribution that is called for on efficiency and equity grounds is likely to be already achieved by the combined effects of the central government redistributive transfers, *tr*, fiscal equalisation transfers, *fe*, and the average amount of redistribution inherent in state government budgets.

State redistributive transfers are only needed for the subtle reason that a state's pattern of net fiscal benefits across labour types may differ from the national benchmark. Perhaps the main way that could occur is if the cost of government services, *PG*, is (say) lower in a particular state, call it state A, due to higher government productivity. It is not efficient to penalise state A for its lower costs through a lower fiscal equalisation transfer because that would penalise

individuals for choosing to live in a lower cost state. Hence, *PG* does not appear in equation [29], the formula for a state's efficient fiscal equalisation transfer, except where it is used in equalising government fixed costs.

Instead, in the likely event that the true demand for government services is price inelastic, the lower cost of government services in state A means that it will need to spend less on government services than higher cost states. Further, other things being equal, state A will be able to recognise its lower cost of government services by levying lower residence-based taxes. However, this also means that higher income earners will provide less help to pay for the costs of providing state government services for lower income earners than in other states (because less help is needed). This makes the budget of state A less redistributive than the budgets of other states.

As a consequence, state A offers a higher net fiscal benefit for higher income earners and a lower net fiscal benefit for lower income earners compared to the national standard. This would result in inefficient inward migration of high income earners and outward migration of lower income earners. To avoid this, Pareto efficiency requires that state A uses redistributive transfers, *str*, to lift the amount of redistribution in its budget up to the national benchmark, in accordance with equation [31].

In practice, states may not use redistributive transfers in this way. If that is the case, it raises the question of whether it is still appropriate to base fiscal equalisation payments on equations [29] and [30]. This study does not offer a definitive answer to that question. However, given the subtle nature of the argument for state redistributive transfers and the attractiveness of the simplicity of the fiscal equalisation formula, we think it is sensible for federations to use that formula in the absence of a better alternative.