Equal, optimal 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 in the theoretical literature and by recent changes to Australian policy. This paper assesses the efficacy of full equalisation from both perspectives.

Using a general theoretical model, Albouy (2012) finds that full equalisation is optimal for source-based taxes, but not for residence-based taxes or costs. This paper extends Albouy's model and further interprets the results. It finds in favour of full equalisation for source-based taxes and the fixed costs of government. However, equalisation should be limited to the effects of differences in state population compositions for residence-based taxes and the variable costs of government. This equalisation scheme supports locational efficiency for labour, while the central government achieves vertical equity and interstate migration achieves horizontal equity.

In Australia, the fiscally strongest state, Western Australia, complained about full fiscal equalisation, leading to a Productivity Commission (2018) Inquiry. The Productivity Commission recommended changing to a grants system of equalisation, while in response the government decided to phase in a standard state system. This paper uses the Commonwealth Grants Commission (CGC) assessment for 2026/27 to test the effects on consumer welfare of alternative equalisation policies. Data from the 2021 Census is used to estimate the impact of each state's population composition on its ability to raise revenue from residence-based taxes. The gain in welfare from moving from the previous Australian scheme of full equalisation to optimal equalisation is estimated. In contrast, losses in welfare are estimated from moving from full equalisation to the grants system, the standard state system or to minimal equalisation.

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 entails funds being transferred from fiscally advantaged donor states to fiscally disadvantaged recipient states until fiscal capacities are 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 original theoretical grounds for full fiscal equalisation quickly 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 offers a way of achieving horizontal equity in which individuals can allow for all factors that influence their welfare, not just net fiscal benefits.

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 driven by marginal productivity rather than net fiscal benefits.

Albouy (2012) uses an extended version of the Boadway and Flatters (1982) model to call into question the finding that full equalisation always supports locational efficiency for labour. Albouy (2012) introduces interstate differences in productivity and consumer amenity into the model. He finds that: "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 extends the model used by Albouy (2012) and re-interprets some of the policy implications for equalisation of residence-based taxes. While the literature on fiscal equalisation has focussed more on state government revenues than their expenditures, the Australian fiscal equalisation system covers both sides of state budgets. Consequently, the modelling in this paper models government expenditures in more depth. This treatment allows demand for government services to vary across types of individuals and it makes a distinction between the fixed and variable costs of providing those services. The Goods and Services Tax (GST) plays a central role in the Australian equalisation system, so this paper also introduces a consumption tax into the theoretical model.

The general rule derived from maximising welfare in this paper's model is that locational efficiency for labour requires that each state offers the same type of labour the same dollar value of government services net of taxes, or nominal net fiscal benefit.

As in Albouy (2012), this general rule leads to full equalisation for source-based taxes. These taxes, such as those applied to mineral resources and land, raise revenue from non-residents and so should be fully equalised. In addition, this paper also finds in favour of 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.

For residence-based taxes, this paper lies between Albouy (2012) and Boadway and Flatters (1982) in finding that a specific, limited form of equalisation is optimal. The paper finds that the influence of population composition, but not other factors, should be taken into account in assessing the capacity of states to raise revenue from residence-based taxes. It also finds in favour of the same limited form of equalisation for the variable costs of government. To arrive at this interpretation, this paper varies the Albouy (2012) model by separating equalisation transfers from other central government transfers that target vertical equity.

The optimal fiscal equalisation in this paper establishes 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. This resembles the user pays approach stressed by Albouy (2012), apart from the different interpretation of equalisation for residence-based taxes.

Australian Equalisation Policies

The Australian system of full equalisation survived until complaints from the state with the highest assessed fiscal capacity, Western Australia. These 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 has the higher assessed fiscal capacity per capita. No state can be assessed to have a higher fiscal capacity per capita than the standard state. Compared to full equalisation, standard state equalisation benefits Western Australia as the state with the highest assessed fiscal capacity per capita.

At various times either NSW or Victoria have advocated for the virtual abolition of fiscal equalisation. So, this paper also considers minimal fiscal equalisation, which abandons all equalisation except for indigeneity.

This paper quantifies the effects on consumer welfare of the alternative proposed equalisation schemes broadly following the approach used by Albouy (2012) for Canada. These welfare effects are estimated using the latest CGC application year, 2026/27. The first step is to use our formula for optimal equalisation to obtain the welfare-maximising transfers in that year. In the second step, the loss of consumer welfare from departing from those optimal transfers under each alternative equalisation scheme is quantified.

In the first step, we need to apply limited equalisation as part of estimating the optimal transfers. To do that, we use the 2021 Census, which is the most recent Census, 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 in state productivity levels for the same labour type.

The second step is in three parts. 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 are both donor relief systems. 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 optimal 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 optimal fiscal equalisation formula. The model synthesises Boadway and Flatters (1982) with Albouy (2012), adds the Australian-oriented enhancements introduced above and offers fresh insights on optimal 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 assess proposed alternative approaches to full equalisation. That is, they estimate the change in consumer welfare under each alternative policy compared to under full equalisation.

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 welfare-maximising system. These differences are illustrated 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 differences in capacity arising from differences in 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 gain in welfare from moving from the full equalisation to optimal/efficient equalisation or to a variant that is 80% efficient.

Section 6 presents the six main qualifications to the analysis.

Section 7 summarises the proposal for optimal equalisation developed in this paper and sets out the changes needed to the current system to implement the proposal.

2 EQUALISATION MODEL

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

2.1 Model

The model used here draws on Boadway and Flatters (1982) and Albouy (2012). While Boadway and Flatters (2012) present a range of models, this paper refers to 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 can be seen from Table 1, the model used here contains three main enhancements, all of which are designed to make it more useful in the Australia setting. First, the model introduces a consumption tax, as the Goods and Services Tax (GST) plays a central role in fiscal equalisation in Australia. Second, the model allows for the fixed costs of state government, as these feature in Australia's fiscal equalisation arrangements. Third, the model takes into account that state governments provide different levels of services to different individuals, as differences in individual needs also play an important role in Australian equalisation.

In the model, the national population is classified into different labour market types. In practice, likely ways of distinguishing between these types include age, educational attainment and indigeneity status as illustrated in section 4. The national supply of each type is assumed to be fixed.

Labour is assumed to be mobile between states. Consequently, 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. This removes horizontal equity as a motive for fiscal equalisation.

At the same time, the central government pursues vertical equity using the tax-transfer system. This is represented as a set of net transfers between labour types that sum to zero. Thus, the central government achieves vertical equity through the tax-transfer system, removing vertical equity as a motive for fiscal equalisation.

This leaves only one role for the fiscal equalisation transfers, which are also made by the central government. That role is to ensure that differences in fiscal capacities between states do not distort the locational decisions of each type of labour. This is part of ensuring that the national labour market for each labour type operates efficiently.

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	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 by labour type
Individuals	heterogeneous	heterogeneous	heterogeneous
Asset holdings (state/national)	national	national	national
Key differences between states	Skill-mix of individuals	Skill-mix of individuals; economic rents; productivity; consumer amenity	Skill-mix of individuals; economic rents; 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

The motivation for fiscal equalisation arises from economic differences between states. In the model, the structure of state economies can differ in three ways.

First, states can vary in their amenity to consumers. A state with higher amenity to likely to attract 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.

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, until real wages for a given labour type, adjusted for amenity, are equated between 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. The model assumes that individuals hold portfolios of national assets rather than state assets, so that property income is independent of state of residence. This removes state differences in property income as a direct distortion to labour location decisions in the model. At the same time, labour location decisions are influenced by the effects of the availability of fixed factors of production on the marginal productivity of labour, as required for efficiency.

All three structural state 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.

Like each type of labour, the supply of capital is assumed to be fixed at the national level but mobile between states. While it would be inappropriate to assume a fixed national supply of capital in a study of corporate tax, it is a more innocuous assumption in the current context of analysing labour location decisions.

For capital to be efficiently allocated across states, its marginal product must be uniform across states. Otherwise, returns to the stock of national capital could be increased by re-allocating capital from states where its marginal product is lower to states where it is higher. The marginal product of capital will be uniform across states provided its rental price is also uniform.

On the supply side of the capital market, capital owners will arbitrage between states until the returns they receive exclusive of each state's source-based capital tax are the same. For capital returns to be uniform across states both before this tax (the efficiency condition) and after this tax (the arbitrage condition), each state must apply the same source-based capital tax rate.

It follows that if states can levy a source-based capital tax such as a corporate tax, as they can in some countries (Canada but not Australia), a Pareto optimum requires that all states apply

corporate tax at the same rate, as found by Boadway and Flatters (1982) and confirmed by Albouy (2012).

Like the models of Albouy (2012) and Boadway and Flatters (1982), the model here allows for a second state source-based tax, namely a tax on a state's fixed factor. Land and mining-based taxes fall in this category. Because the supply of the fixed factor is fixed at the state level, the issue of locational efficiency does not arise.

Turning to residence-based taxes, the model here follows Albouy (2012) in allowing for taxes on labour, interest (i.e. income from capital) and rents (i.e. income from the fixed factor). State income tax (which is not applied in Australia) and state payroll tax fall in this category. In addition, the model extends the previous modelling by allowing for a tax on private consumption, such as the Australian GST.

State governments also provide a good, which is assumed to be private rather than public in nature. Typical examples are education and health services. While the previous modelling assumes that each individual in a state consumes the same amount of this government good, the model here allows consumption of the government good to vary between labour types. This takes into account that consumption of some state government services varies between individuals with attributes such as age and indigenous status. The model here also develops the modelling of Boadway and Flatters (1982) and Albouy (2012) by allowing for the fixed costs of a state government administration.

In the model, government policy decisions are assumed to be made by a benevolent planner. This benevolent planner has four main tasks. First, the planner needs to ensure that it makes the optimal supply of the state government good to each labour type in each state. Second, the planner needs to achieve vertical equity in making redistributive transfers between labour types. Third, the planner needs to support an efficient locational distribution of labour through fiscal equalisation between states. Fourth, as already noted, the planner needs to support an efficient locational distribution of capital by setting a uniform rate of source-based capital tax across all states.

As shown rigorously in the Appendix, the condition for an efficient locational distribution of labour is that, for a given type of labour, every state offers the same non-labour income. This is so location decisions for each labour type are driven by the marginal product of labour and are not distorted by signals from non-labour income. Determining whether this condition for uniform non-labour income is met involves considering each of the three categories of non-labour income to see if each category is the same level in all states, for a given type of labour.

The first 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 uniformity requirement. Furthermore, central government transfers that differentiate simultaneously between labour

type and state of residence can be unconstitutional in some federations, including in the Australian federation.

The second category of non-labour income is property income, including rental income from both capital and land. In the model, property income for a given labour type is independent of state of residence, so property income also meets the uniformity requirement. This follows from the assumption that individuals of a given type own the same portfolio of national assets irrespective of their state of residence.

While this assumption follows some previous literature, including Albouy (2012) and the final model of Boadway and Flatters (1982), there is also a literature that assumes that individuals own a share of assets in the state in which they live, including in one of the earlier models considered by Boadway and Flatters (1982). If individuals only hold assets of their own state, their location decisions can be influenced by state differences in property income. However, in reality private wealth does not change merely as a result of moving from one state to another, even though portfolio compositions may change. So to remove this doubtful influence on location decisions, this paper assumes that individuals own a share of national assets, rather than a share of state assets. This means that property income does not influence location decisions.

The third category of non-labour income is the net fiscal benefit offered by each state to an individual of a given labour type. This net fiscal benefit is equal to the value of state government services received by that individual net of the value of the state residence-based taxes that the individual is required to pay. In general, in the absence of fiscal equalisation, net fiscal benefits will not be uniform across states for the same type of individual.

In the model, there are three main reasons that some states will 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 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. In general, 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 net fiscal benefits, rather than driven efficiently by state differences in real wages adjusted for state amenity. However, equalisation transfers can be used to remove this locational inefficiency, as originally emphasised by Buchanan (1952).

2.2 Optimal Fiscal Equalisation Formula

The Appendix formally derives the optimal fiscal equalisation formula, which is obtained at its equations [27] and [28]. The formula is reproduced below. Under this formula, each state is funded to offer the same labour type *e* the same net fiscal benefit, res_e, as required for efficient labour location. Recall that the net fiscal benefit is equal to the value of state government services received net of the value of the state residence-based taxes that are paid, as reflected in equation [28].

$$fe^j = \left[GF^j/N^j - \sum_j GF^j/N\right] - \left[tL^j r^j L^j/N^j - \sum_j tL^j r^j L^j/N\right] - \left[tK^j i^j K^j/N^j - \sum_j tK^j i^j K^j/N\right] + \sum_e \left(N_e^j/N^j - N_e^{TOT}/N\right) res_e \quad [27]$$

$$res_e = \frac{1}{N_e^{TOT}} \left\{ \begin{array}{c} \sum_j PG^j N_e^j g_e^j - \sum_j tc^j PC^j N_e^j c_e^j - \sum_j tw^j N_e^j w_e^j \\ -\theta_e \sum_j \frac{N_e^j tI^j}{N_e^{TOT}} \sum_k (1 - tK^k) i^k K^k - \theta_e \sum_j \frac{N_e^j tR^j}{N_e^{TOT}} \sum_k (1 - tL^k) r^k L^k \end{array} \right\} \quad [28]$$

Equation [27] shows the optimal fiscal equalisation transfer per capita to state *j* of fe^j. The right hand side of equation [27] conveniently decomposes the components of the state budget into those that should be fully equalised and those that should be subject to limited equalisation. 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 (GF^j) should be fully equalised. A state government receives from the equalisation pool its state fixed costs and pays into the pool its per capita share of the fixed costs for all states. In that way, each state faces the same per capita fixed costs. 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 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.

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 net fiscal benefit (res_e). This limited equalisation only takes into consideration state differences in fiscal capacity that arise from

state differences in population compositions. In particular, if the share of a labour type in a state population (N_e^j/N^j) is higher than in the national population (N_e^{TOT}/N), the state is funded to provide the national net fiscal benefit to its excess population of that labour type. 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.

To apply limited equalisation, it is necessary to analyse state fiscal advantages and disadvantages resulting from differences in population compositions. For this purpose, it is appropriate to cross-classify populations using attributes such as age, educational attainment and indigeneity status. Section 4 demonstrates how limited equalisation can be applied in practice using data from the 2021 Census.

The case for limited rather than full equalisation only applies to the net fiscal benefit. However, the net fiscal benefit, as defined in equation [28], accounts for a large part of state government budgets. That equation constructs the net fiscal benefit for a given labour type at the national level, as it is uniform across states under optimal fiscal equalisation. The net fiscal benefit covers all of government spending other than the fixed costs and is net of consumption taxes such as GST, labour income tax such as payroll tax, and residence-based taxes on asset incomes. Australia currently calculates full equalisation of government spending, GST and payroll tax, so replacing this with limited equalisation is a notable reform.

Limited equalisation, rather than full equalisation, of the net fiscal benefit is consistent with applying a user pays approach to providing state government services, where users pay through state residence-based taxes. For this to work efficiently, price signals need to be transmitted from expenditures to revenue raising, without any offset from equalisation. For example, if providing government services in a state is expensive because of remoteness or an inefficient state government, it is important this price signal is transmitted to residents of that state through higher residence-based taxes. In contrast, under full equalisation, a higher net fiscal benefit would be inappropriately paid to subsidise the higher cost of service provision.

Similarly, if a state has higher amenity leading more individuals to choose to live there in a trade-off with lower productivity and wages, it is important that the full impact of lower wages is felt so that the trade-off is made efficiently. This trade-off will be made inefficiently if full equalisation is used to compensate higher amenity states for the lower revenue base resulting from lower wages.

Finally, it is important to confirm that locational efficiency thorough fiscal equalisation transfers, and vertical equity through redistributive transfers, can be achieved at the same time. To fully pursue vertical equity, the central government must control total redistributive transfers (F_e) between labour types. This involves setting its own redistributive transfers (tr_e), after taking into account the amount of vertical redistribution already achieved in state

government budgets through the dependence of state net fiscal benefits on labour type ($res_e - \overline{res}$).

$$F_e = tr_e + res_e - \overline{res} \quad [29]$$

This assumes that state governments all follow the same redistribution policy in determining the net fiscal benefit that they offer to each labour type. With each state operating the same redistribution policy, the central government can exercise control over the total extent of the vertical redistribution across labour types.

Another reason that redistribution policies need to be synchronised across states is so fiscal equalisation can achieve locational efficiency. If one state chooses to pursue greater vertical redistribution than other states, it is likely to result in inefficient migration involving an outflow of higher-skilled labour and an inflow of lower-skilled labour.

This raises the issue of whether it is likely that state redistribution policies will be synchronised. Boadway and Flatters (1982) make the following assumption about the progressivity of provincial government budgets in Canada.

> 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.

Similar assumptions are reasonable for state government budgets in Australia and are also consistent with the models used in Albouy (2012) and here. Thus, government budgets in each state are likely to achieve some progressive, vertical redistribution between labour types.

At the same time, there are likely to be some small differences in state budgets arising from state differences in productivity and amenity. This could lead to some minor variation between states in the amount of vertical redistribution generated by their budgets. In the theoretical model in the Appendix, this minor variation is eliminated using suppositional state government redistributive transfers. That is, these transfers play the fine tuning role of synchronising vertical redistribution across state budgets. They do not change the overall vertical redistribution achieved by state budgets when viewed from a national level.

2.3 Relationship to previous studies

As already noted, Buchanan (1952) and Boadway and Flatters (1982) call for full equalisation of both residence-based and source-based taxes. However, their findings for residence-based taxes stem from the assumption that states only differ in their population compositions. 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 proposed here that is based on population compositions only.

This analysis is also consistent with the model of 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".

This may appear to differ from our finding that there should be limited equalisation, rather than no equalisation, of residence-based revenues. However, the two studies can be reconciled. The first step is to re-write the optimal fiscal equalisation formula of equation [27] more simply as follows.

$$fe^j = X^j + \overline{res_j} - \overline{res} \qquad [30]$$

Here X^j covers the terms involving full equalisation. The remaining term shows that limited equalisation involves a per capita transfer equal to the difference between the average net fiscal benefit for a state and the corresponding national average. Such differences arise from the differences between states in their population compositions.

Because low income earners receive high net fiscal benefits and high income earners receive low net fiscal benefits, our formula involves fiscal equalisation transfers in the expected direction, from high income states to low income states. This represents the equalisation advocated by Buchanan (1952) for the differences in fiscal capacities arising from differences in population composition.

Albouy (2012) presents his results in a different form. Rather than isolate fiscal equalisation transfers as in equation [30], he provides results for an omnibus government transfer that combines the transfers for fiscal equalisation and vertical redistribution. Thus, this government transfer $\left(F_e^j\right)$ varies by both state and labour type. It is also paid directly to individuals.

To put our results in the same form as Albouy (2012), we first construct a comparable omnibus government transfer. This omnibus transfer adds together our fiscal equalisation transfer given by equation [30] and our vertical redistribution transfer, tr_e.

$$F_e^j = \left(X^j + \overline{res_j} - \overline{res}\right) + tr_e \qquad [31]$$

As explained in the discussion of equation [29], the role of the vertical redistribution transfer (tr_e) is to achieve a target level of vertical redistribution (F_e) after taking into account the vertical redistribution already achieved through net fiscal benefits. Using equation [29] to eliminate tr_e in equation [31] puts our results in the same form used by Albouy (2012).

$$F_e^j = X^j + \overline{res_j} - res_e + F_e \qquad [32]$$

This equation includes an equalisation term for the difference between the average net fiscal benefit for a state and the net fiscal benefit for a type. Since high income earners receive low net fiscal benefits this appears to involve transfers in the opposite direction to before, from low

income earners to high income earners. Albouy (2012) explains this as follows: "households paying more than the average (i.e. high income earners) should have excess taxes refunded to them by the federal government, insuring that local taxes operate as user fees".

The conclusion of Albouy (2012) is appropriate when referring to an omnibus government transfer. However, our conclusions are appropriate when referring more specifically to fiscal equalisation transfers.

Our optimal fiscal equalisation formula provided in full in equations [27] and [28] and in abbreviated form in equation [30] features limited equalisation for residence-based taxes. This limited equalisation captures Buchanan's concern of equalising for differences in fiscal capacities arising from differences in population compositions.

Our theoretical framework also provides some insights into the equalisation of state government expenditure. Boadway and Flatters (1982) and Albouy (2012) do not model this as they assume that government services are demanded and provided at the same level to everyone. This means that no state enjoys a population composition-related fiscal advantage or disadvantage in meeting expenditure needs.

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. This paper confirms that such differences in expenditure needs based on population compositions should be fully equalised, as Albouy (2012) surmises. As also noted above, this paper also finds that the fixed costs of government should be fully equalised. Australia practices both forms of equalisation. However, Australia goes further by equalising for differences in costs and prices affecting government expenditures. This step away from pricing state government services through the state tax system reduces efficiency.

3 THE AUSTRALIAN AND OPTIMAL FISCAL EQUALISATION SYSTEMS

In Australia, as in most other federations, a system of fiscal equalisation is used to address concerns that states have different fiscal capacities. Historically, the system has been motivated by a desire of governments to achieve horizontal equity. As a result, it differs in some respects from the approach developed in section 2, which is based on supporting an efficient national labour market.

The Australian equalisation system is unusually comprehensive in two ways. First, equalisation is applied not only to state government revenues but also to state government expenditures. Second, from 1981/82 until 2020/21, 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. For example, 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.

For the purposes of 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.

The method of delivering equalisation varies between jurisdictions. 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.

This section analyses the general factors used by the CGC in making its calculations for full equalisation against the optimal 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 optimal 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 traditional 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 government 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, which they are. 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 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, these 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. The Australian practice of 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 a state's labour income. However, that 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 report, 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, which is the latest Census. Section 4 also explains how this differs from full equalisation.

Turning to the equalisation of expenditures for wage costs, the CGC appropriately seeks to obtain a pure measure of wage costs by controlling for a wide range of population composition and other factors that lead to differences in average wage rates between states. 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 optimal 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 (2026) report 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, they 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), Table S5-6.

For modelling purposes, these drivers are aggregated to broader categories, related to 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 optimal transfers. It can be compared directly with the full equalisation transfers shown in Table 3A.

Finally, Table 3C shows a version of the optimal transfers after a discount of 20% has been applied. Thus, the discounted transfers in Table 3C are calculated as 80% of the optimal transfers shown in Table 3B. Excluded from this discounting is equalisation for indigenous status and for certain Commonwealth payments. The discounting is applied to recognise the limitations in the way that some of the drivers are quantified.

For tax revenue revenue, there are six drivers in Table 3A. Three of these are classified to the "source-based" revenue category: 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.

Table 3B: Drivers of optimal 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	

Table 3C: Drivers of 80% 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	3 505	7 154	-4 617	-8 581	1 499	480	502	58	13 198	80% equalisation
Taxable land values	-2 906	- 386	1 513	803	514	198	174	88	3 291	80% equalisation
Property sales	-1 830	142	266	413	599	246	15	149	1 830	80% equalisation
Taxable payrolls	- 88	- 255	271	69	35	22	- 91	38	434	80% demographic
Motor and insurance tax bases	- 53	- 153	162	41	21	13	- 55	22	260	80% demographic
Other taxes	- 43	- 125	132	34	17	11	- 45	18	212	80% demographic
Non-tax revenue	0	0	0	0	0	0	0	0		
GST: imputed less epc revenue	1 126	- 133	- 667	33	- 335	- 161	80	56	1 296	80% of adjustment
GST: equalisation	- 199	- 578	614	156	79	49	- 207	85	983	80% demographic
TOTAL REVENUE	- 486	5 666	-2 325	-7 031	2 429	858	374	513	9 841	
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	- 159	- 239	427	- 133	424	129	- 315	- 133	980	80% demographic
Other SDC (a)	143	- 308	- 34	- 26	298	- 51	- 61	39	480	80% demographic
Administrative scale	- 593	- 416	- 253	56	179	322	333	372	1 262	80% 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	- 730	- 77	170	479	6	- 31	153	30	838	80% demographic
Other expenses	- 85	- 739	520	518	- 132	- 23	- 176	117	1 155	80% demographic
Cost of construction	0	0	0	0	0	0	0	0	0	nil equalisation
Other investment expenses (b)	- 155	642	- 193	527	- 582	- 303	- 304	368	1 537	80% demographic
TOTAL EXPENSE AND INVESTMENT	-1 006	-4 909	2 270	1 733	- 148	283	- 540	2 316	6 603	
Commonwealth payments	641	1 983	-1 201	- 870	45	- 186	163	- 575	2831	full adjustment
Total effect of assessed relativities	-851	2740	-1255	-6167	2326	955	-3	2255	8277	

The remaining three categories of tax revenue are classified to both the "economic" and demographic categories. These revenue sources are payroll tax, which was discussed earlier, motor and insurance taxes, and "other taxes". These taxes are 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 revenue items should be narrowed so that it is limited to demographic circumstances. That approach is followed under the optimal approach of Table 3B. Interestingly, the CGC does not equalise "other taxes" because of the challenges in making appropriate calculations under full equalisation. Hence, in Table 3A the equalisation transfers for other taxes are zero.

The final category of revenue in the tables is non-tax revenue, which includes interest and dividends. The CGC argues that "non-tax revenue" is driven by population size, so no equalisation is needed. This seems appropriate.

While the GST itself is not explicitly included in Table 3A, it does have its own implicit equalisation treatment. The starting point for the equalisation is unclear, because there is no data on how much GST revenue is actually collected in each state. This is because the GST is

collected by the central government, which imposes a uniform national rate of 10 per cent. However, the finishing point for this equalisation is clear. In particular, as noted earlier, 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 optimal 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 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. 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 optimal equalisation in section 2. Otherwise, the resulting high state tax burden will lead to inefficient, fiscally-induced outward migration.

Some of the drivers 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 political 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, these ought not to be equalised for from an efficiency perspective. Hence there is no equalisation for wage or construction costs under the optimal approach of Table 3B.

3.3 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 results 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" (Dixon et al. 2002, p19).

Independent Economics (2015) also use a multi-regional CGE model but make the more common assumption 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. Mining royalties would have been a much less important factor in Dixon et al. because real mineral prices were much lower in 2002 than in 2015.

In a precursor to this paper, Murphy (2018) follows Albouy (2012) in moving from a CGE analysis of alternative equalisation schemes to a theoretical analysis of the optimal scheme. Welfare losses from sub-optimal schemes are then estimated, as described in section 5.

4 FULL AND LIMITED EQUALISATION IN PRACTICE

This section shows how limited equalisation could be implemented for residence-based taxes and how this differs from full equalisation. Limited equalisation involves isolating differences in revenue-raising capacity that arise from differences in state population compositions. In Australia a similar type of demographic analysis is already conducted on the expenditure side of the budget, so this section concentrates on how it can be extended to the revenue side.

Two main data sources are used. 2021 Census data is used to measure how population compositions vary from state-to-state and to estimate the capacity of each population type to contribute to the tax base. The 2026/27 CGC equalisation assessments provide information on state revenue collections from residence-based taxes.

The optimal equalisation formula presented as equation [27] in section 2 includes full equalisation for source-based taxes and limited equalisation for residence-based taxes. To provide context for how limited equalisation works, it is useful to begin by considering full equalisation as applied to source-based taxes.

Under full equalisation, drawing from equation [27] and after some manipulation, the transfer payment to a state ($transfer^j$) for a source-based tax can be written as follows, using simplified notation.

$$transfer^j = national\ revenue.\left[popshare^j - revenueshare^j\right]$$

This formula indicates that a state receives an equalisation transfer from other states if there is a shortfall of its revenue share from its population share. The problem with this form of equalisation is that it is not policy-neutral. In particular, if a state raises its tax rate in an attempt to raise more revenue, there is a broadly offsetting reduction in its equalisation transfer because its revenue share rises.

For a more policy-neutral approach, it is standard to adjust the equalisation formula by replacing a state's revenue share with its tax base share.

$$transfer^j = national\ revenue.\left[popshare^j - baseshare^j\right]$$

Under this formula, a state is assessed to have a fiscal disadvantage if its share of the national tax base is less than its share of the national population. It receives a transfer equal to this share difference multiplied by the national revenue from the tax. Because share differences always sum to zero, the transfers in each row of Tables 3A-3C always sum across states to zero.

Under this formula for full equalisation, states are always compensated if their share of a tax base is less than their share of the population, irrespective of the reasons for that shortfall. The analysis of section 2 found that this approach of full equalisation is optimal for source-based taxes. However, limited equalisation is optimal for residence-based taxes.

For a residence-based tax, the transfer to a state under limited equalisation is given by the following formula. Again, the formula is derived starting from the relevant term in equation [27] and shares of revenue are replaced with shares of the tax base.

$$transfer^j = national\ revenue.\left[popshare^j - \sum_e \frac{N_e^j\ \overline{base_e}}{base}\right]$$

Compared to the previous formula for full equalisation, this formula for limited equalisation replaces a state's actual share of the tax base, with the share predicted from its population composition. In particular, a state's tax base is re-calculated by replacing the average tax base generated by state members of each labour type with that generated by national members of the same labour type. Thus, under limited equalisation, a state is compensated for a shortfall in its share of the tax base (compared to its share of the population) to the extent that shortfall arises because of the state's population composition. Conversely, it is not compensated to the extent that the shortfall arises because state members of a type are underperforming national members of the same type in generating a tax base.

Thus, compared to full equalisation, limited equalisation avoids compensating states for underperforming relative to a national benchmark with respect to a person of a given labour type. Such underperformance is a market signal for efficient outwards interstate migration. Subsidising that underperformance through full equalisation would work to maintain an inefficient locational distribution of labour.

The CGC already uses limited equalisation, but this use is on the expenditure side rather than the revenue side of state budgets. Table 3A shows these cases of limited/demographic equalisation on the expenditure side. In dollar terms, the most important example is equalisation for indigenous status.

On the revenue side of the budget, Table 3B indicates that it is optimal to apply limited (or demographic) equalisation to four revenue categories. Those categories are GST, payroll tax, motor & insurances taxes and other taxes, which include gambling taxes.

Revenue from these "residence-based taxes" is driven by a state's income. Hence, such taxes can be viewed as a user charge for state government services. Limited equalisation for these residence-based taxes is undertaken in four steps.

The first step is to cross-classify the population into labour types. For this paper, a detailed and up-to-date population cross-classification was generated from the 2021 Population Census database. 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 the 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.

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

The second step is to analyse the tax base at the national level against the labour types. The best measure available from the 2021 Census of the base for residence-based taxes is personal income. The average annual personal income for the 570 income-earning types is $42,600, as shown in Chart 1.

There is considerable variation in income across the 570 income-earning types relative to the average income of $42,600. The top-earning type is people of 50 to 54 years of age, who are non-indigenous and have a Postgraduate Degree. Their average personal income is $127,300. The high variation suggests that the three attributes taken together are informative about how population composition affects personal incomes.

The third step is to determine the influence of state-to-state variation in population composition on state-to-state variation in average personal incomes. Based on population composition, the predicted average personal income of a state is calculated according to the predicted tax base formula given above. That is, average state incomes are calculated after replacing state average incomes for each type with national average incomes for the same type. This gives predicted state personal income per head, as shown in Chart 1. With this replacement, 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)

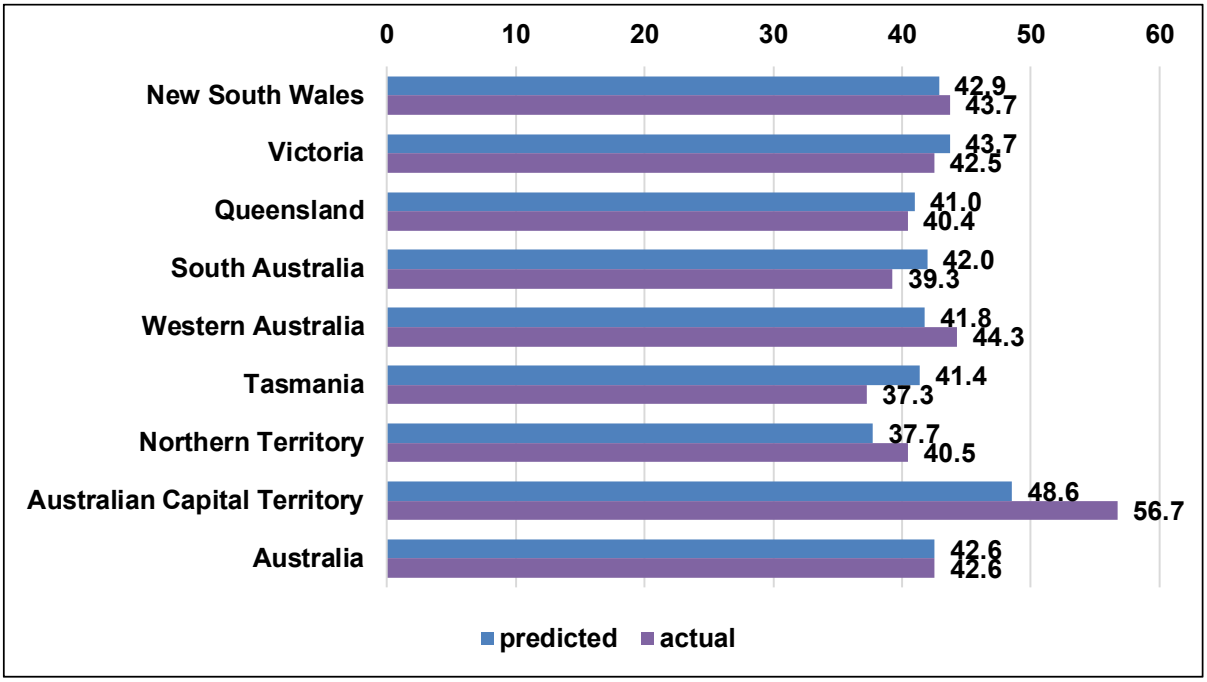


Chart 1 implies that predicted annual personal income per head is within two per cent of the national figure of $42,600 for three states – NSW, SA and WA. This suggests that, in 2021, population composition had a broadly neutral impact on the ability of these three states to raise revenue from state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

The remaining five states show some variation in how population composition affects their ability to raise revenue from state income-based taxes. Victoria has a small advantage of around 3 per cent, while Tasmania and Queensland have small disadvantages of 3 and 4 per cent respectively. The outliers are the territories, with the ACT having an 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, rather than state tax bases predicted from population composition alone. This means it subsidises states that systematically underperform in generating tax bases/incomes for the same labour types. 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 allowed to act as a

market signal for migration to the ACT. Applying full rather than limited equalisation for residence-based taxes blunts this market signal.

The fourth and final step calculates the limited equalisation transfers, 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 the formula above, 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 reproduces the equalisation estimates for the four categories from Table 3B.

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
Taxable payrolls	-110	-319	339	86	44	27	-114	47	0
Motor and insurance tax bases	-66	-191	203	52	26	16	-68	28	0
Other taxes	-53	-156	165	42	21	13	-56	23	0
GST: equalisation	-248	-722	767	195	99	62	-259	106	0
limited equalisation for residence-based taxes ($m)	-477	-1388	1474	375	190	119	-497	204	0

5 EMPIRICAL ANALYSIS

This section estimates the effects of alternative equalisation policies on consumer welfare. In calculating these welfare effects, one of the policies needs to be chosen as the reference point. The initial calculations use the optimal policy as their reference point, so that the deadweight losses from departing from an optimum can be calculated. However, when presenting the results in the report, full equalisation is used as the baseline. This is achieved by adjusting the original results for each scenario for the effects of full equalisation compared to optimal equalisation.

Relative to this baseline of full equalisation, optimal equalisation must result in a welfare gain, because optimal equalisation is designed to maximise welfare. On the other hand, it is an empirical question whether moving from full equalisation to one of the other alternative equalisation policies would result in a welfare gain or a welfare loss.

Full equalisation is the natural baseline for all three policy questions that we wish to address. This is because Australia practised full equalisation up until 2020-21 and some early literature considered that full equalisation was optimal. The three policy questions are as follows.

1) Would it have been beneficial to heed calls 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 in 2018 and the standard state scheme that was legislated by the government in response.

3) Is optimal equalisation a material improvement on full equalisation.

In the initial calculations, the optimal equalisation transfers, which are taken from the final row of Table 3B, are used in estimating the impact on consumer welfare of the other scenarios, which are all sub-optimal. By varying the pattern of interstate transfers from the optimal pattern, the other scenarios distort locational decisions for labour. Albouy (2012) estimates the resulting welfare losses using the following deadweight loss (DWL) formula, which depends on three variables.

$$DWL = -\frac{1}{2}\,\epsilon \sum_{j} \left(t^{j}\right)^{2} Y^{j}$$

First, the DWL generated in each state depends, in part, on the difference between the optimal transfer for a state and the transfer that it receives, expressed as a share of state income. This implicit tax rate t^j on state income will be positive for some states and negative (i.e. a subsidy) for other states.

Second, the DWL depends on ϵ, the long-run elasticity of a state's population with respect to changes in its income per capita resulting from changes in its net fiscal benefit. Drawing on North American evidence, Albouy (2009) uses a population elasticity of -6.0 for migration between US cities, while for migration between Canadian provinces Albouy (2012) uses an elasticity of -3.23. It makes sense that the inter-city elasticity is larger because some inter-city migration will be intra-provincial rather than inter-provincial.

Third, the DWL estimate also depends on each state's income, Y^j.

In referring to the use of the population elasticity in the DWL formula, 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.

The welfare effects reported in this paper are similar to estimates obtained using the DWL formula but are generated using a different method. The welfare effects are actually generated using a mini version of the model in the Appendix. This mini model approach has the advantage that it takes into account that the implicit tax rates in the DWL formula are not entirely independent of population shifts. For example, a population outflow spreads the fixed cost of a state government more thickly over a smaller population, requiring a higher tax rate on state income to re-balance the state budget.

We initially calibrated the mini model to imply a population elasticity for inter-state migration of -3, similar to Albouy's (2012) elasticity for inter-provincial migration of -3.23. However, using that estimate causes our mini model to fail in the minimal equalisation scenario. This is because the first round loss of income to the NT is very large relative to the size of that state economy and that triggers an unending spiral in which the tax rate on state income keeps rising and the state population keeps falling.

In light of that result, we temper the value of the population elasticity to -2. This is a long run elasticity, and the state population adjustments that it refers to can take a decade or more to fully develop. This is through a gradual process of interstate migration and state selection of settlement by incoming migrants. In section 6 we show the large, slow shifts is state population shares that have occurred historically.

To calculate the welfare effects, a baseline year needs to be chosen. The latest CGC (2026) 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 in terms of equalisation drivers was shown for 2026/27 in Table 3A. Thus, the final row of Table 3A matches the 2026/27 baseline transfers shown in Table 6.

We now turn to the results for the various policy scenarios in a series of three sub-sections. These cover minimal equalisation, donor relief equalisation schemes, and optimal equalisation in both full and discounted form. As noted above, the economic impacts of each scenario are reported against a baseline policy of full equalisation.

5.1 Minimal equalisation

Under the minimal equalisation proposal, there is no equalisation except for indigenous status. Thus, the transfers under minimal equalisation shown in Table 6 match the equalisation transfers for indigenous status shown in Table 3A. Equalisation for indigenous status is retained so the state government costs from indigenous disadvantage are shared between states.

Under minimal equalisation, GST revenue would be distributed between the states on an equal per capita (EPC) basis, apart from the equalisation transfers for indigenous status. Table 6 compares the equalisation transfers under minimal equalisation with the transfers under the baseline of full equalisation, which are taken from Table 3A.

If these transfers are re-expressed on a per capita basis, WA has the biggest gain and NT the biggest loss in moving from full to minimal equalisation. WA gains mainly from removing the economically efficient equalisation of mining royalties. NT loses both from removing the economically inefficient equalisation for population dispersion and removing the economically efficient equalisation for administrative scale.

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

	baseline (full equalisation)	minimal equalisation
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

Overall, moving to a minimal equalisation system from full equalisation would result in a loss in consumer welfare of $891 million in 2026/27, as seen in Chart 2. These substantial losses reflect the fact that the optimal equalisation system detailed in Table 3C is much closer to a full equalisation system than it is to a minimal equalisation system. That is, most of the equalisation under full equalisation is justified on economic grounds.

Moving to a minimal equalisation system from full equalisation would generate substantial welfare losses partly because it would confer WA with a fiscal gain at the expense of other states. Some reduction in the donor transfer from WA is optimal, from the full equalisation transfer of $8,531 million (Table 3A) to the optimal transfer of $7,570 million (Table 3B). However, a minimal equalisation system would go much further by making WA a recipient state that receives a transfer of $312 million (Table 6). This fiscal benefit to WA from moving from full or optimal equalisation to minimal equalisation is more than the amount of revenue that WA is currently projected to raise from payroll tax in the same year of $6,546 million.

Thus, moving to a minimal equalisation system could fund the WA government to establish a tax haven by abolishing payroll tax. Alternatively, WA could use its new substantial fiscal advantage, achieved from unequalised mining royalties, in some other way to draw economic activity from other states. The resulting inefficient interstate migration is estimated, in the long term, to boost the population of WA by 9.1 per cent at the expense of the other states (Table 7).

On the other side of the minimal fiscal equalisation coin, the NT would incur a very large fiscal loss. Some reduction in its recipient transfer is optimal, from $4,244 million under full equalisation (Table 3A) to $2,581 million under optimal equalisation (Table 3B). However, further reducing the transfer to $1,524 million under a minimal equalisation system (Table 6) would put a large strain on the NT economy.

By comparison, in 2026/27, the NT government is projected to raise only $1,278 million in its own taxes and royalties. This low revenue base puts the NT government in a poor position to make up for the large revenue loss it would face under a move to minimal equalisation.

In fact, minimal equalisation would take the NT economy close to a tipping point. As equalisation transfers are withdrawn from the NT, the NT's population contracts. This results in its large, fixed fiscal disadvantage from its population composition being spread more thickly over a progressively smaller population. Increasingly this offsets the population elasticity effect, so that a tipping point is reached in which further population reductions no longer succeed in helping per capita consumer welfare to recover, leading to a downward spiral in the population. The minimal equalisation scenario takes the NT economy close to this tipping point. The estimated NT population loss is 36.0 per cent (Table 7).

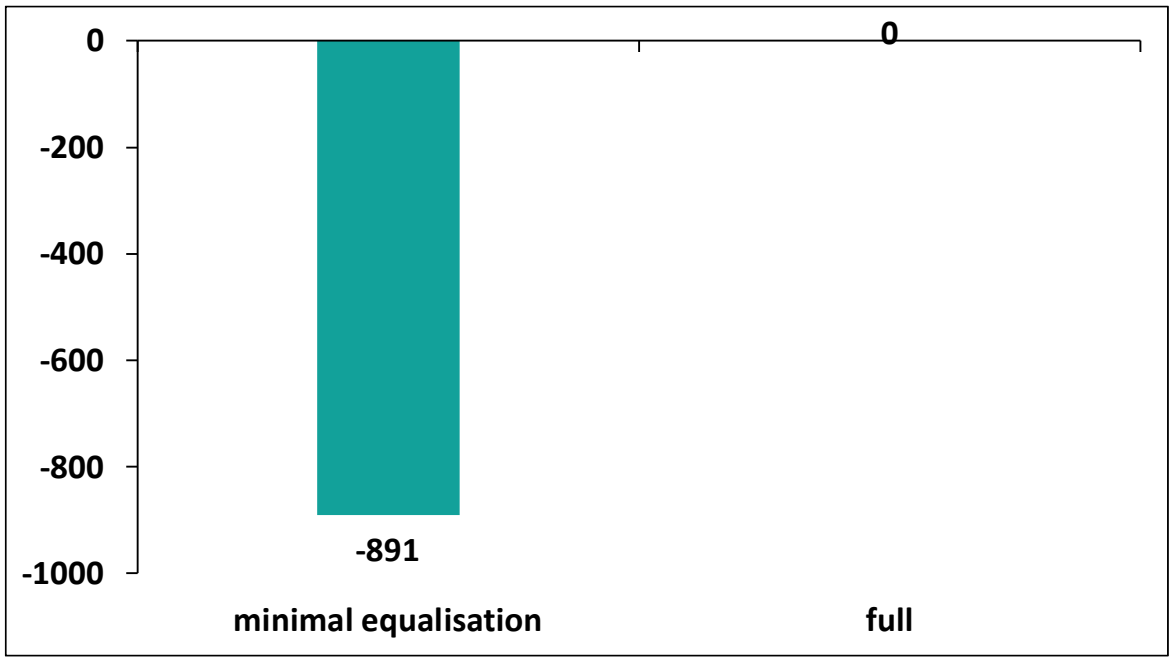
We can now answer the first policy question that was posed at the beginning of this section, which was whether it would it have been beneficial to heed calls to largely abandon full equalisation by moving to minimal equalisation. Clearly it would not have been as it would have resulted in an annual welfare loss of $891 million.

This welfare loss would occur because full equalisation is much closer to the optimal system than is minimal equalisation. In other words, most of the equalisation under full equalisation is justified on economic grounds. Moving from full equalisation to minimal equalisation would have also resulted in a massive shrinkage in the NT economy.

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

NSW	1.5%
Vic	-3.3%
Qld	2.0%
WA	9.1%
SA	-6.1%
Tas	-10.4%
ACT	-3.8%
NT	-36.0%
Total	0.0%

Chart 2: Welfare impact of Minimal equalisation
(deviations from full equalisation baseline, $m per year)



5.2 Donor relief systems

We now analyse two types of equalisation schemes that give some relief to donor states. These are the grants scheme recommended by the PC in 2018 and the standard state scheme that the government adopted in response.

Grants equalisation

In its final report on "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 arrives at this description as part of breaking the equalisation process down into three steps. The PC recommends the ETA as a way of providing a "reasonable" level of equalisation.

A more convincing way of developing an equalisation scheme involves maximising economic welfare, which then determines the equalisation transfers in a single step. An example of this was seen when economic principles were used to develop an optimal system of equalisation transfers, presented in equations [27] and [28] of this paper.

The 3-step ETA scheme recommended by the PC is mathematically equivalent to the grants equalisation scheme that is discussed in the literature, so hereafter we refer to it as grants equalisation. Under grants equalisation, the full equalisation transfers are calculated first. However, the donor states (NSW, Queensland and WA) are then relieved of their obligation to directly fund the transfers to the recipient states. This changes the full equalisation transfers in Table 6 to the "initial grants" in Table 8A. These grants now need a new funding source.

Table 8A: Grants equalisation transfers ($ million)

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

The initial grants to the recipient states are now funded indirectly from the pool of general revenue payments to all states. This results in a uniform reduction in the per capita grant that each state receives, as reflected in the "cost of grants" column of Table 8A. The "initial grants" adjusted for the "cost of grants" then determines the effective final equalisation transfers appearing in the final column.

Alternatively, the cost of the grants could be funded via the central government budget rather than by the states themselves. However, the final outcome for taxpayers in each state is likely to be similar in both cases because ultimately taxpayers have to fund both the central and state government budgets. If the grants are funded from payments to the states, taxes are likely to be higher at the state level, and if the grants are instead funded by the central government, taxes are likely to be higher at the national level.

The grants scheme leaves all recipient states worse off compared to full equalisation. This is because they are required to partly self-fund their own fiscal disadvantage when they pay their state population share of the cost of the grants. The grants scheme also fails to take into account the differences between states in their fiscal advantages, as all states that were formerly donor states now contribute uniformly to the cost of the grants based on their state population shares.

The issues with the grants scheme can be illustrated taking the case of the most fiscally advantaged state, WA. Under the full equalisation system, in 2026/27, WA would have paid an equalisation transfer of $8,531 million (Table 3A) and under optimal equalisation it would have paid a bit less, $7,570 million (Table 3B). However, under the grants scenario, WA instead would pay a transfer of only $1,486 million (Table 8A). While grants equalisation is not as generous to WA as minimal equalisation, it is still generous enough to allow WA to come close to abolishing payroll tax, if it so chose.

Standard state equalisation

Instead of adopting the PC recommendation to implement grants equalisation, in 2018 the Australian government decided to transition to standard state equalisation. Under this system, the standard state is either NSW or Victoria, whichever has the higher assessed fiscal capacity per capita. No state can be assessed to have a higher fiscal capacity per capita than the standard state. This means that any state that actually does have a higher fiscal capacity receives donor relief.

So far, the standard state has always been NSW. Standard state equalisation has provided a large amount of donor relief to WA and a small amount of donor relief to Queensland[2]. While standard state equalisation has provided donor relief mainly to WA, grants equalisation would have provided donor relief to all donor states (NSW, Queensland and WA).

While the standard state system is actually applied separately to the three assessment years, here we apply it at the end of the process, to the application year. This simplification has only a small effect on the results, including that the small amount of donor relief to Queensland disappears, leaving WA as the only state with donor relief.

Under standard state equalisation, the full equalisation transfers are calculated first, just as they are under grants equalisation. However, any states that are fiscally stronger than the standard state are then treated as if this wasn't the case. This changes the full equalisation transfers in Table 6 to the "initial transfers" in Table 8B. Specifically, the payment from WA falls from $8,531 under full equalisation to $1,157 million under standard state equalisation, while other transfers are unchanged. After this reduction, the transfer from WA matches the transfer from NSW when both transfers are re-expressed on a per capita basis.

[2] The CGC applies the standard state system separately for each of the three assessment years (2022/23, 2023/24 and 2024/25) that feed into the calculations for the application year, 2026/27. NSW was the standard state in all three assessment years. The standard state system delivered a large amount of donor relief to WA in all three assessment years, and a small amount to Queensland in the first two assessment years.

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

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

This reduction in the WA transfer results in a funding shortfall of $7,373 million (Table 8B). Similar to grants equalisation, this shortfall is funded indirectly from the pool of general revenue payments to all states. This results in a uniform reduction in the per capita grant that each state receives, as reflected in the "cost of WA relief" column of Table 8B. The "initial transfers" adjusted for the "cost of WA relief" 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 in the standard state scenario compared to the baseline scenario (Table 6) in 2026/27.

The main divergence of the standard state scheme from the optimal scheme is in its more generous treatment of WA. In 2026/27, it means WA pays $1,976 million (Table 8B) compared to its optimal payment of $7,570 million (Table 3B), a shortfall of $5,594 million. The effect of standard state equalisation is to greatly reduce the extent to which WA's mining royalties are equalised with other states.

Like the grants system, the standard state system is not as generous to WA as minimal equalisation, but it is still generous enough to allow WA to come close to abolishing payroll tax, if it so chose. As noted above, in 2026/27 WA is projected to raise $6,546 million from payroll tax, which is not much more than the saving to it from standard state equalisation of $5,594 million.

Population and welfare effects

We now consider the effects on state populations and national economic welfare from the two donor relief schemes. These effects are simpler for standard state equalisation, so we begin with that.

The move to a standard state system would enable WA to establish a tax haven based on a very low payroll tax rate. Alternatively, WA could use its new substantial fiscal advantage to inefficiently draw economic activity from other states in some other way. The resulting

interstate migration is estimated, in the long term, to boost the population of WA by 6.7 per cent (Table 9) at the expense of the other states compared to under full equalisation. The other states have a uniform population loss of 0.8 per cent (Table 9).

Overall, moving to the standard state scheme would result in a loss in consumer welfare of $245 million in 2026/27, as seen in Chart 3. This loss reflects the fact that the optimal equalisation system detailed in Table 3C is closer to the existing full equalisation system than is the standard state scheme. This is partly because the optimal equalisation system, like the full equalisation system, includes full equalisation of mining royalties, rather than the effective very partial equalisation under the standard state system.

In broad terms, the effects of the grants scheme are similar to the effects of the standard state scheme. In both cases, the main development is that the largest donor state, WA, receives generous relief from making transfers to other states. Effectively, equalisation of WA's mining royalties is greatly reduced. This is welfare reducing because it is efficient to fully equalise for differences in mineral endowments.

In fact, the reductions in welfare are similar under both donor relief equalisation schemes, as can be seen from Chart 3. Moving to the grants scheme would result in a loss in consumer welfare of $265 million in 2026/27, similar to the estimate of $245 million for the standard state scheme.

The main driver of the small difference in welfare effects between the two schemes is the more excessive donor relief for WA under the grants scheme compared to the standard state scheme. This more excessive donor relief for WA leads to the slightly larger welfare loss under the grants scheme.

On the other hand, the grants scheme has the possible advantage of being smaller than the standard state scheme. It entails $8,399 million in redistribution (Table 8A) compared to $10,641 million (Table 8B) under the standard state scheme.

The grants scheme has generally similar effects on state populations to the standard state scheme. The more excessive donor relief for WA under the grants scheme, compared to the standard state scheme, boosts the WA population gain, relative to under full equalisation, from 6.7 per cent to 7.2 per cent (Table 9).

Overall, the results suggest that the grants scheme and the standard state scheme should be rated about the same.

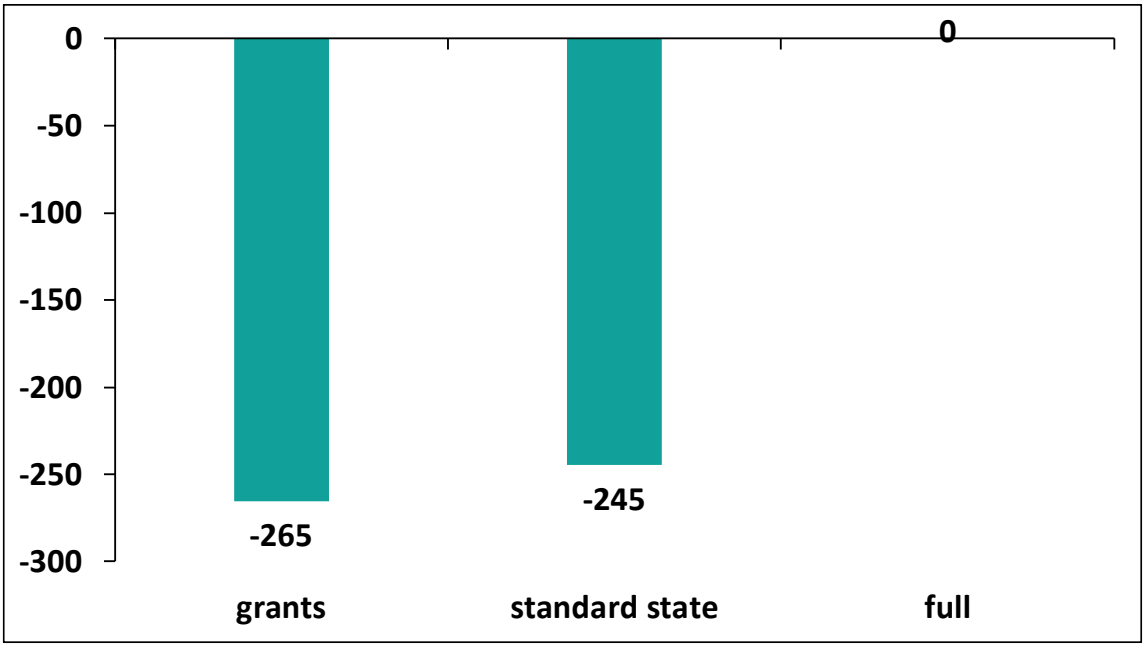
We can now answer the second question that was posed at the beginning of this section. This was whether the two donor relief schemes considered in 2018 were better or worse than the full equalisation scheme that was already in place. The results indicate that both proposed schemes were worse, with annual welfare losses of $265 million for a grants scheme and $245 million for the standard state scheme that was actually adopted. Thus, Australians would have

been $245 million better off on an annual basis if they had kept full equalisation instead of adopting the standard state scheme, which will be fully phased in from 2026/27.

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

	grants	standard state
NSW	-0.3%	-0.8%
Vic	-1.5%	-0.8%
Qld	-0.6%	-0.8%
WA	7.2%	6.7%
SA	-1.5%	-0.8%
Tas	-1.5%	-0.8%
ACT	-1.5%	-0.8%
NT	-1.4%	-0.8%
Total	0.0%	0.0%

Chart 3: Welfare impacts of donor relief systems
(deviations from full equalisation baseline, $m per year)



5.3 Efficient equalisation: complete and 80%

We now turn to the general issue of the whether the welfare-maximising equalisation scheme developed in this paper provides a material improvement on full equalisation. Full equalisation is an important benchmark because some early research found that it was optimal and it is still often advocated.

Optimal/Efficient Scenario

The optimal equalisation scenario was constructed using the equalisation formula derived in the Appendix and was explained in section 2. The formula was implemented in sections 3 and 4, with the resulting equalisation transfers reported in Table 3B. Those transfers are also reproduced here in Table 10.

Spahn (2007) suggests that the previous Australian system of full equalisation is 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, optimal equalisation reduces complexity by requiring fewer calculations on both the expenditure and revenue sides of state budgets.

On the expenditure side, optimal 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 to Table 3B.

On the revenue side, optimal equalisation reduces complexity by replacing separate equalisation for certain residence-based taxes (payroll tax, insurance & motor taxes) with a single demographic-based equalisation covering all residence-based taxes. The additional residence taxes that are covered under optimal equalisation are the GST and "other taxes".

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 essentially 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 equalise gambling taxes (CGC, 2026, 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.

[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.

As noted above, the 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.

This equalisation of residence-based taxes is efficient because it is limited to equalising for the effects of differences in state population compositions, as set out in section 4. For example, it does not equalise for differences in state economic productivity for the same labour types.

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.

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. After we have estimates for GST collections by state, we can include GST with other residence-based taxes and apply demographically-based equalisation.

Overall, 'optimal' equalisation involves moderate changes from a system of full equalisation (unlike the major changes involved under minimal equalisation). This is because most of the equalisation under full equalisation is optimal, including the full equalisation for source-based taxes, demographic effects and the fixed costs of government. Thus, in 2026/27, a move from full equalisation to optimal equalisation would involve only a moderate reduction from $13,390 million to $10,616 million in the value of transfers from donor states to recipient states (Table 10).

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

	baseline (full equalisation)	efficient	80% efficient
NSW	-3,238	-1,367	-851
Vic	3,599	3,873	2,740
Qld	-1,621	-1,677	-1,255
WA	-8,531	-7,570	-6,167
SA	3,083	2,982	2,326
Tas	2,030	1,180	955
ACT	435	-1	-3
NT	4,244	2,581	2,255
Total	0	0	0
Redistribution	13,390	10,616	8,277

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 optimal equalisation.

The main single factor driving the changes to equalisation transfers that do occur under optimal 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 optimal 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.

80% Efficient Scenario

The principles of fiscal equalisation can be difficult to translate into practice. For example, in theory, mining royalties should be equalised based on mining capacity. However, this capacity would be difficult to measure, so in practice mining royalties are equalised using mining production. The limitation of this approach is that there may be differences between state governments in their willingness to convert mining capacity into mining production.

There are also limitations in how other areas of state budgets are equalised. One way of trying to take into account the limitations of how equalisation principles are translated into practice in the calculations of equalisation transfers is to apply a discount to those calculated transfers. To illustrate this approach, a discount of 20% is applied in an 80% efficient scenario.

This 20% discount is applied to all the drivers of equalisation transfers apart from equalisation for indigenous status and for Commonwealth payments. Full equalisation for indigenous status is retained for comparability with the minimal equalisation scenario. It is maintained for Commonwealth payments because they can be measured accurately.

The calculations for the 80% efficient scenario were shown in Table 3C which can be compared to the fully efficient scenario in Table 3B. The final state transfers under both scenarios are compared in Table 10. It shows that the 20% discounting reduces the value of transfers from donor states to recipient states from $10,616 million to $8,277 million.

Population and welfare effects

We now consider the effects on state populations and national economic welfare from the two efficiency-based equalisation schemes. The effects of these two policies are closely related, so we proceed by discussing the effects of the efficient policy and then more briefly discuss how these effects change under the 80% efficient policy.

This changes in the state pattern of transfer payments seen in Table 10 are reflected in the effects on state populations seen in Table 11. 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).

The lower donor payments required of NSW and WA lead to modest population gains of the order of 1% (Table 11). On the other hand, the lower receipts for Tasmania and the NT induce larger population losses in percentage terms of 4.7% and 17.7% 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.

Because of the welfare-maximising nature of the optimal scenario, all of these population shifts are efficient. Compared to full equalisation, they result in a gain in consumer welfare of $281 million in 2026/27, as seen in Chart 4. For the same reason, the optimal scenario will result in a higher level of consumer welfare than any other scenario.

Turning to the 80% efficient scenario, it results in a welfare gain of $239 million (Chart 4). This is necessarily less than the welfare-maximising gain under the optimal or efficient scenario.

We cross-check this result for the 80% scenario using the deadweight loss (DWL) formula presented at the beginning of this section. As noted previously, our welfare effects are generated using a stripped-down model instead of the DWL formula.

When the 20% discount is applied to the efficient equalisation transfers, we introduce distorting taxes/subsidies on state incomes that are 20% of the size of the distorting taxes under minimal equalisation. After applying the squaring factor in the DWL formula to this 20% discount, the formula predicts that the 80% efficient scenario should result in only (20% x 20% =) 4% of the welfare cost of the minimal equalisation scenario, when both scenarios are compared to the efficient scenario. We calculate the actual loss ratio below using the results from Charts 2 and 4.

$$DWL\ ratio = \frac{80\%\ efficient\ scenario}{minimal\ equalisation\ scenatio} = \frac{281 - 239}{281 - (-891)} = \frac{42}{1172} = 3.6\%$$

Thus, we get the predicted result that the 80% efficient scenario has only about 4% of the welfare cost of the minimal equalisation scenario, when both scenarios are compared to the efficient scenario. This is one case where the so-called 80/20 rule works, namely that going 80% of the way captures nearly all of the potential benefit.

In practice, the 80% efficiency scenario may do even better than this. If there is a case for discounting equalisation on the basis of limitations in measuring equalisation transfers (which the DWL estimates do not take into account), it is possible that the 80% efficiency scenario could even lead to higher welfare than the fully efficient scenario.

The gains in consumer welfare under the efficiency scenarios are likely to be shared widely. The optimal scenario 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 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 all states.

Thus, some states may lose residents and others may gain residents, but in the long term the residents of all states will share in the boost to living standards of a given labour type.

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 optimal equalisation is material. The annual welfare gain of $281 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 optimal 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 seems like a good idea. Further, efficient equalisation has the advantage of being less complex than full equalisation.

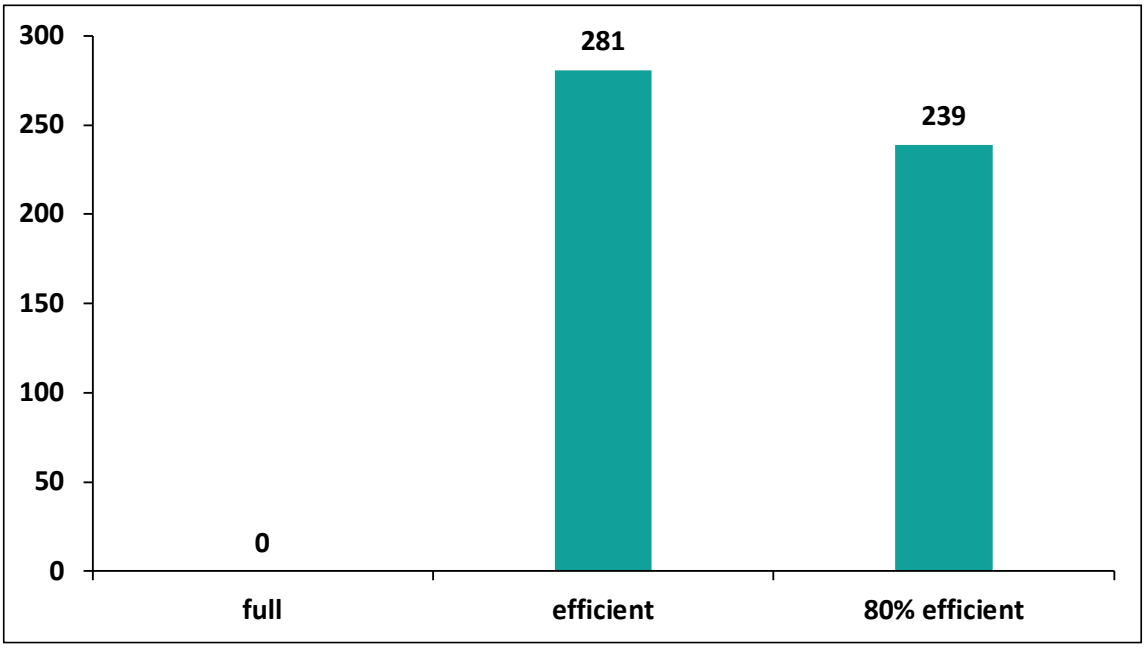
A related question is whether it is worth having an equalisation scheme at all, even if it is optimal. To answer that question, we need to compare the effects of optimal and minimal equalisation. From the denominator of the DWL ratio calculated above, we see that optimal equalisation produces an annual welfare gain of $1,172 million compared to minimal equalisation.

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. A welfare gain that represents 29 cents in the dollar of this increase in inter-state transfers seems worth having.

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

	efficient	80% efficient
NSW	0.7%	0.9%
Vic	0.1%	-0.4%
Qld	-0.1%	0.2%
WA	1.0%	2.5%
SA	-0.2%	-1.3%
Tas	-4.7%	-6.0%
ACT	-2.9%	-2.9%
NT	-17.7%	-21.8%
Total	0.0%	0.0%

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



6 QUALIFICATIONS

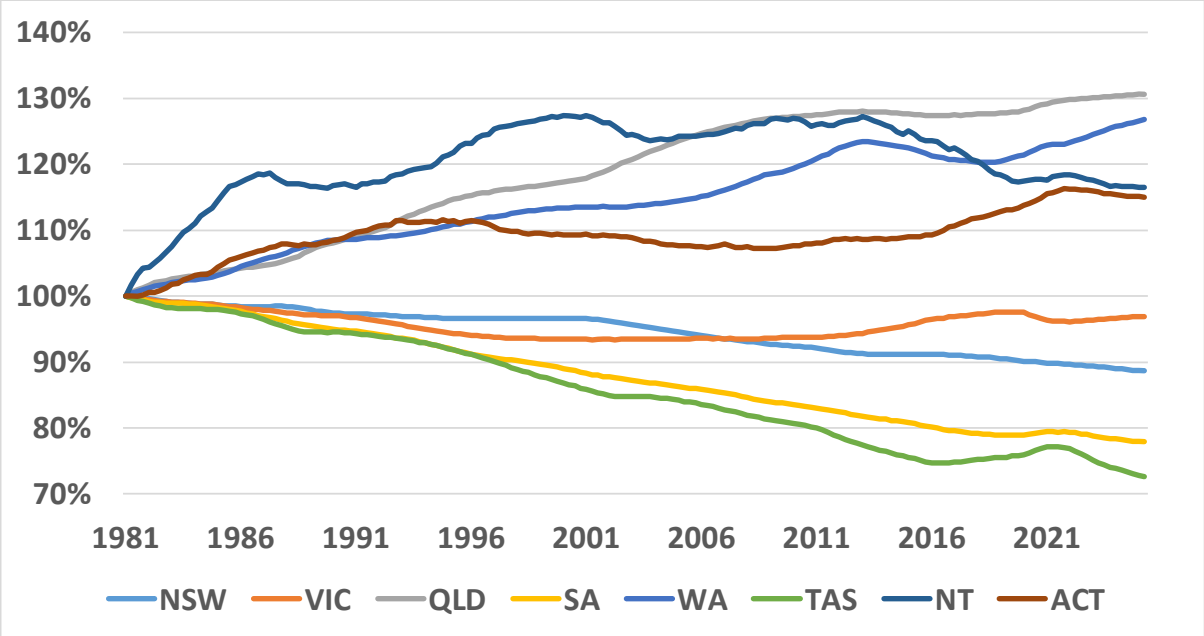
Six qualifications to the theoretical model used here, and therefore the associated empirical analysis, are as follows.

First, following Boadway and Flatters (1982) and Albouy (2012), the modelling treats the national supplies of each type of labour and capital as fixed. This would not be reasonable in an analysis of the efficiency of taxes applied to these factors of production. However, this paper focusses on the specific issue of fiscal equalisation, where the key issue is achieving locational neutrality for labour decisions rather than efficiency in the total supply.

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".

Consistent with this, the historical evidence suggests that in Australia a high degree of labour mobility between states has been achieved over time. This mobility has involved a combination of interstate migration and state selection of settlement by arriving immigrants. Thus, compared to a scenario in which state shares of the national population had remained fixed, Chart 5 shows that since 1981 the population of Queensland, Western Australia and the Northern Territory have all risen by more than 20 per cent, while the populations of South Australia and Tasmania have both fallen by over 20 per cent. By comparison, the modelled population movements shown in Table 11 for the optimal equalisation scenario are relatively small, and might plausibly be achieved in around a decade.

Chart 5: 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 presented 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 optimal 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 optimal, 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 $245 million in 2026/27. Standard state equalisation has created the circumstances where WA can afford to almost entirely 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 and final step in implementing our proposal is to switch from full equalisation to optimal/efficient equalisation to maximise welfare. The paper finds that this would result in a further welfare gain of $281 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. Optimal equalisation retains full equalisation for source-based taxes, namely mining royalties, stamp duties on conveyances and land tax. Full equalisation is optimal 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. Optimal 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 optimal 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. Optimal 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. Optimal 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. Optimal 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. Optimal 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 optimal equalisation system significantly simplifies the existing full equalisation system and generates a gain in annual consumer welfare estimated at $281 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 optimal 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 optimal fiscal equalisation. In the meantime, optimal equalisation can play the useful role of providing a backstop for some shortcomings in the design of the Australian Federation.

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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 optimal 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. The individual's income measured in units of the intermediate good is allocated to the private and government goods.

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

The individual's indirect utility depends on prices of the two consumption goods (*PC, 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 in whichever state they live, 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 ***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.

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

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.

$$K^{TOT} = \sum_j K^j \quad [4]$$

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

A benevolent planner aims to maximise social welfare. This includes achieving a Pareto optimum. 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].

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

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

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

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

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

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

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

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

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

$$\nu_e = \pi\left(y_e^j - w_e^j\right) \quad [13]$$

$$\kappa = -\pi i^j \quad [14]$$

The two important first order conditions for present purposes are those associated with the optimal state distributions of capital (equation [14]) and each type of labour (equation [13]). These equations use the result that a profit-maximising producer operating under perfect competition will equate the marginal product of each factor with its tax-inclusive price. These tax-inclusive factor prices are represented by the wage *w*, and the rental price of capital *i*.

Equation [14] implies that, for capital to be optimally allocated across states, its rental price or marginal product must be uniform across states. On the supply side of the capital market, capital owners will arbitrage between states until the returns they receive exclusive of each state's source-based tax on capital are the same. For returns to be equated across states both before and after the source-based tax, each state must apply the same tax rate. Hence, if states can levy a source-based corporate tax, a Pareto optimum requires that they all tax at the same rate.

Turning to equation [13], it implies that for each type of labour to be optimally allocated across states, the non-labour income (*y*-*w*) offered by each state for a given type of individual must be the same. This is so location decisions for each labour type are driven by the marginal product of labour and are not distorted by signals from non-labour income.

Putting this another way, equation [13] can be manipulated to state that, for an individual of a given type, non-labour income in any state is equal to the national average.

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

This condition for the optimal allocation of each type of labour across states is at the core of deriving the welfare-maximising formula for fiscal equalisation. The next step is 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 between different types of individuals aimed at achieving vertical equity. These transfers are according to the type of individual.

$$\sum_e N_e^{TOT}\, tr_e = 0 \qquad [16]$$

The second is fiscal equalisation transfers. These transfers are according to state and are paid to state governments.

$$\sum_j fe^j \sum_e N_e^j = 0 \qquad [17]$$

Distinguishing between these two types of central government transfers assists in reconciling the equalisation findings of Albouy (2012) and this paper.

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. However, such differentiation can be achieved by state governments undertaking their own redistributive transfers within their own states.

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

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

The left hand side shows state government expenditures. As stated earlier, a distinction is made between the variable expenditures and fixed expenditures (*GF*) of state governments. Fixed expenditures take into account that any state government will incur some minimum level of costs, independent of the size of the state population, in establishing and maintaining an administrative structure.

State government expenditures also include provision for redistributive transfers within each state (*str*). These state transfers, when averaged across state budgets, do not change the vertical redistribution achieved by those budgets. Rather, they play the fine tuning role of synchronising vertical redistribution across state budgets, as explained later.

$$str_e = \frac{1}{N_e^{TOT}} \sum_j N_e^j str_e^j = 0 \quad [19]$$

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 term extends Albouy (2012) with the inclusion of a state consumption tax at the rate *tc*. The remaining terms follow Albouy (2012) by allowing for source-based taxes on land and capital at the rates *tl* and *tK*, and residence-based taxes on labour, capital and land incomes at the rates *tw*, *tI* and *tR* respectively.

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.

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

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*.

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 or fiscal residuum of *res*, which is defined in equation [21].

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

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

We can now return to equation [15], the key condition for obtaining an optimal 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].

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

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].

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

The optimal 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 optimal allocation of labour across states is as follows.

$$res_e^j = \frac{1}{N_e^{TOT}} \sum_j N_e^j \, res_e^j = res_e \qquad [24]$$

This is the optimality requirement for locational efficiency in which each state offers the same type of individual the same net fiscal benefit. The fiscal equalisation rule derived below provides each state with the funding needed to achieve that outcome.

For this funding to translate into each state providing the same pattern of net fiscal benefits across labour types, states need to synchronise their vertical redistribution policies. Such synchronisation is also necessary to dovetail with the vertical redistribution policy of the central government. In the model, states can synchronise their vertical redistribution policies using the state redistributive transfers introduced earlier.

A.2 Optimal 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].

$$\sum_e N_e^j \, res_e + GF^j = fe^j \sum_e N_e^j + tL^j r^j L^j + tK^j i^j K^j \qquad [25]$$

The above state government budget constraint can be aggregated over states to obtain the all states budget constraint in equation [26]. This aggregation uses the fact that the fiscal equalisation transfers sum to zero, as required by equation [17].

$$\sum_e N_e^{TOT} \, res_e + \sum_j GF^j = \sum_j tL^j r^j L^j + \sum_j tK^j i^j K^j \qquad [26]$$

Expressing both the state and all states budget constraints in per capita form, subtracting the all states constraint from the states constraint, and re-arranging gives the solution for the optimal fiscal equalisation transfers expressed on a per capita basis.

$$fe^j = \left[GF^j/N^j - \sum_j GF^j/N\right] - \left[tL^j r^j L^j/N^j - \sum_j tL^j r^j L^j/N\right] - \left[tK^j i^j K^j/N^j - \sum_j tK^j i^j K^j/N\right] + \sum_e \left(N_e^j/N^j - N_e^{TOT}/N\right) res_e \quad [27]$$

The above equalisation formula involves the national average for the net fiscal benefit of a type e individual (res_e). This national average is constructed in equation [28] using equation [21]. In this process, equation [19] is used to set the national average for state redistributive transfers to zero.

$$res_e = \frac{1}{N_e^{TOT}} \left\{ \begin{array}{c} \sum_j PG^j N_e^j g_e^j - \sum_j tc^j PC^j N_e^j c_e^j - \sum_j tw^j N_e^j w_e^j \\ -\theta_e \sum_j \frac{N_e^j tI^j}{N_e^{TOT}} \sum_k (1 - tK^k) i^k K^k - \theta_e \sum_j \frac{N_e^j tR^j}{N_e^{TOT}} \sum_k (1 - tL^k) r^k L^k \end{array} \right\} \quad [28]$$

The optimal equalisation scheme given by equations [27] and [28] is interpreted in section 2.