Final Report

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# The spatial and distributional impacts of the Henry Review recommendations on stamp duty and land tax


authored by

**Gavin Wood, Rachel Ong, Melek Cigdem and Elizabeth Taylor**


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| **Authors** | Wood, Gavin | RMIT University |
| | Ong, Rachel | Curtin University |
| | Cigdem, Melek | RMIT University |
| | Taylor, Elizabeth | RMIT University |
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# ACRONYMS

| | |
|---|---|
| ABS | Australian Bureau of Statistics |
| CBD | Central Business District |
| COAG | Council of Australian Governments |
| GFC | Global Financial Crisis |
| HSARWP | Housing Supply and Affordability Reform Working Party |
| LGA | Local Government Area |
| NHSC | National Housing Supply Council |
| PPR | Principal Place of Residence |
| SEIFA | Socio-Economic Indexes for Areas |
| SID | Savings Income Discount |

# EXECUTIVE SUMMARY

This report is the second Final Report of a project that examines the impact on supply and affordability from implementation of the Henry Review recommendations in relation to negative gearing, land tax and stamp duty. There are two main recommendations from the Henry Review on tax reform that have a *direct* bearing on supply and affordability. The first is to introduce a savings income discount of 40 per cent on the net rental income (including capital gains) from most non-business assets other than shares. The impacts of this discount on housing supply and affordability were examined in our first final report. The second recommends the abolition of stamp duties on conveyance and their replacement by a broad based land tax that is levied on a per-square-metre and per land holding basis, rather than retaining present land tax arrangements.

This report aims to assess the extent to which the Henry Review recommendations on stamp duty and land tax would affect the costs of purchasing and holding properties across geographical locations, and offers estimates of their capitalisation into land values. Our study sample comprises houses and vacant residential land within metropolitan Melbourne in the year 2006. The analysis exploits a novel database developed by Taylor (2011). The database links records from the Victorian Valuer-General property sales and valuations datasets. The final merged dataset contains detailed information on each property transaction's sales price, date of sale, land size, age of dwelling and a series of other characteristics that offer a rich source of spatial information. The two datasets have been linked for all Melbourne municipalities.

To address the research question, we design a policy simulation model that aligns with the Review's recommendations. The model comprises two key components. The first estimates the revenue foregone in all Melbourne municipalities if stamp duties were abolished. We estimate stamp duty liabilities using the 2006 stamp duty schedule and the sales prices of all residential properties (including vacant land) transacted within metropolitan Melbourne in the year 2006. We estimate that $1.29 billion would be lost through the abolition of stamp duties and a further $261 million would be lost through abolition of the current land tax regime. The second component of our model is a newly designed land tax schedule that contains the features recommended under the Review, but is revenue neutral, that is the land tax schedule is designed to just compensate for the loss of revenue (which amounts to $1.5 billion) through abolition of stamp duty and the current land tax regime. The tax base is measured on land values per square metre and levied on each land plot (rather than the cumulative value of land plots owned by the same taxpayer), in keeping with the Henry Review's recommendations.

Our findings suggest that under the proposed arrangements, the formal incidence of the tax will be felt most keenly where pressure on land use is most acute. This is in part due to progressive marginal rates of land tax; land with higher per square metre values attracts a higher marginal rate of land tax. Hence, we can expect the proposed reforms to speed up development in areas where land is more expensive, especially if developers face binding borrowing constraints (i.e. they are unable to meet land tax payments by borrowing). Furthermore, the proposed land tax will concentrate the tax incidence on municipalities that contain relatively well-off communities.

The removal of stamp duty might also affect the timing of development as its abolition will speed transfers of property from lower value uses to higher value uses and generate efficiency gains, as 'empty nesters' now find trading down is a more effective method of releasing housing equity, with the result that housing stocks are more fully utilised.

Economic theory predicts that a broad based land tax is shifted to landowners who receive lower after-tax rents that are in turn capitalised into lower land values. We find that the average plot with a land value of $335 000 (at 2006 prices) will decline by $24 000, or approximately 5 per cent. However, the expected decline in land value will be greatest in those suburbs in and around the CBD (at around 12%), where land is currently most expensive. However, in suburbs further away from the CBD, the percentage decline in mean land value will be lower at 8 per cent or less. These estimates are conservative because they do not include estimates of the fall in land and house values that will eventuate due to the elimination of stamp duties. Their inclusion will mean that owner occupied housing is more affordable under the proposed reforms, since the aggregate fall in house prices will exceed the capitalised value of land tax payments. There will also be a boost to the supply (and affordability) of rental housing as the broad based land tax puts landlords and home owners on an equal footing.

We can expect criticism when advocating tax reforms because irreversible decisions have been made on the basis of current tax arrangements. For example, when buying a home, purchasers pay stamp duty under current arrangements. If we now abolish stamp duties and replace them by land taxes, previous home buyers will feel aggrieved on the grounds that they are being asked to pay an additional tax. Transitional arrangements can be designed to address this undesirable outcome. For example, if the broad based land tax is introduced when a landowner next makes a purchase, they will only begin paying the land tax on a property which they have not had to pay stamp duty on.

There are some important caveats to our findings. We have omitted flats and apartments from our stamp duty and land tax calculations due to the absence of land area information on these dwellings. The availability of more recent data would provide an opportunity to update the findings using a more recent stamp duty schedule and transaction year. It would also be helpful if the analysis were extended to include commercial, agricultural and industrial land. The analysis would be enriched if replicated on similar property data, but for another capital city with different housing markets and urban forms. We have been unable to measure the impact of the suggested reforms in non-state capital areas of Victoria, so extension of the empirical analysis to the regions would be a worthy extension of the research. The capitalisation analysis assumes that 100 per cent of the land tax will be capitalised into land prices. Further research is warranted on the extent to which the capitalisation actually occurs. Finally, this report analyses the impacts of the recommendations of the Henry Review with respect to land tax and stamp duty, which includes an increasing land tax marginal rate schedule. A potentially important extension of the analysis is to calculate what flat tax rate would achieve the same amount of revenue, and how the capitalisation effects of changes in the tax rate might impact different landowners.

# 1 INTRODUCTION

This research project aims to deepen the evidence base on taxation and housing supply while also contributing to the policy debate in support of the work being undertaken by Housing Ministers, the COAG Housing Supply and Affordability Working Party (HSARWP), and the National Housing Supply Council (NHSC). The AHURI Research Brief 'Research on Housing Supply' highlighted the following key research question:

> What is the impact on supply and affordability from implementation of the Henry Review recommendations in relation to negative gearing, land tax and stamp duty?

There are two main recommendations from the Henry Review on tax reform that have a direct bearing on supply and affordability:

1. Stamp duties on conveyance are to be abolished and replaced by a broad based land tax that is levied according to a progressive rate structure applied to land size.
2. A savings income discount (SID) of 40 per cent will apply to the net rental income (including capital gains) from most non-business assets other than shares.

The impacts of a SID on housing supply and affordability in the private rental market has been addressed in the project's first Final Report (see Wood et al. 2011). In this second report the focus shifts to the Review's recommended changes to state government taxation of land and housing. The most important State government tax instruments are stamp duty on conveyance and land tax on the unimproved capital values of land. Municipal governments' levy rates (property taxes) on unimproved capital values but are not considered in this report.

## 1.1 Current stamp duty and land tax arrangements and proposed reforms

Stamp duties are liabilities that must be met by the purchasers of residential property. Stamp duties are levied on the purchase price of the property with the applicable marginal rate rising across purchase price brackets. Most states provide some form of relief from stamp duties for first-homebuyers although the extent of and eligibility for such relief varies depending on the jurisdiction. The duty schedules also differ depending upon whether the housing has been purchased as a principal residence or as a rental investment. Duty schedules in the latter case impose a higher tax burden. For example, a Victorian investor paying $400 000 for a house will pay a marginal rate of duty equal to 6 per cent, 1 percentage point higher than that paid by the (repeat) home buyer.

Yates (1999) and Productivity Commission (2004) have demonstrated growing accessibility problems among younger age groups, and concerns have been raised about how stamp duties are adding to the cost of buying a home, especially for first home buyers. The 2008 Senate Select Committee on Housing Affordability recommended that 'all state and territory governments consider stamp duty exemptions for first home buyers' (recommendation 7.1). In fact State governments have in recent years taken steps to address accessibility issues by raising duty free thresholds and making bonuses available to first home buyers (see Wood et al. 2010, Chapter 3, for more details).

The evidence from econometric studies of tenure choice indicates that borrowing constraints impede access to home ownership (see Gyourko 2003 for a review) and

since stamp duties add to financing requirements they can tighten borrowing constraints. There is Australian evidence that binding borrowing constraints are a major impediment to transition into home ownership in Australia (Bourassa & Yin 2006; Hendershott et al. 2009; Wood et al. 2003). But even when borrowing constraints are not binding on home purchasers, stamp duties will adversely impact affordability because they increase the price of housing (see Chapter 2 below).

An important recurrent tax liability arises as a result of the application of land taxes to the unimproved capital value[1] of residential land that exempts land used for owner occupied housing, but includes land used for private rental housing. Typically State governments apply land tax above a value threshold, so that small plots of land of relatively low value are zero rated. There is then a progressive schedule with marginal rates that increase with the value of the land. The current land tax regime is clearly a preferential housing tax arrangement that favours home owners over property investors.

Another important feature of land tax arrangements is its measurement of the tax base on an aggregate basis. Thus multiple property owners are taxed on the aggregate value of the land plots that their properties occupy, rather than separately applied to the value of each individual plot of land. This has implications for the supply of affordable rental housing as individuals or financial institutions that invest on a multi-property basis will be hit by the aggregate methods of assessment used for land tax purposes. These tax arrangements make it more difficult for multi-property owners to obtain satisfactory returns on housing portfolios.

Efficiency and equity concerns about current stamp duty and land tax arrangements prompted the following key recommendations (51 to 54) by the Henry Review (see Henry et al. 2009):

- The abolition of stamp duties on all property transactions.
- The levying of land tax on all land.
- Levying land tax using an increasing marginal rate schedule, with the lowest rate being zero and thresholds determined according to per square metre value in order to tax more valuable land at higher rates.
- Levying land tax on a per land holding basis, not on an entity's total holding, to promote investment in land development.

## 1.2 Research question and report outline

Based on the above recommendations, we address the following key research question in our report:

> How will the removal of stamp duties and extension of land tax to all land on a per land holding and per square metre value basis affect the costs of holding properties and their capitalisation into land values?

The report begins with a background section that offers an important and generally neglected analysis of the efficiency, equity and spatial impacts that reform of stamp duty and land tax is likely to have in land and housing markets. This is followed by a method section which details the data sources, addresses measurement issues and describes the policy simulation modelling approach we have invoked to estimate the reform's likely impacts. Descriptive statistics on key variables are then presented with a focus on the size of land tax liabilities land owners can expect to pay. Our main findings are discussed next; comparison of tax liability patterns under the stamp duty

[1] Unimproved capital value is the assessed market value of land in the use that maximises value, but

and land tax schedules are drawn, and we end by offering estimates of capitalisation effects under the assumption that land taxes are applied to a broad base that includes all land regardless of use. A final chapter concludes by drawing out the most salient features of our impact analyses, and listing future directions for research.

# 2 BACKGROUND

There is important though neglected economic analyses that helps us to understand the impacts that reform of stamp duty and land tax is likely to have in land and housing markets. In this section we present these analyses in a way that is accessible to those with some facility with the basic tools of supply and demand that underpin economists' investigations into how taxes impact in markets[2]. These analyses will concentrate on the efficiency and equity consequences that arise because of effects on the allocation of resources and the distribution of income and assets between households.

## 2.1 Theory of tax incidence: conveyance (stamp) duty

All Australian State Governments impose an *ad valorem* duty on the transfer of property including transactions in residential property whether it be owner occupied or rental housing. A progressive rate schedule is applied to the market price of property—that is the unimproved value of land plus all improvements—at each time a property is bought and sold. The formal obligation to pay rests with the purchaser (for details see Chapter 1 and Stewart 2010).

Stamp duty is an unpopular tax with economists. There are four main reasons:

1. There is no strong efficiency rationale. If a good or service is responsible for incidental side effects (externalities) that negatively impact community wellbeing, there is a case for transaction based taxes because they will reduce the quantity traded and hence curb negative side effects. (The contemporary illustration of this argument is the Federal Government's proposed carbon tax.) But there is no obvious reason why property should be picked on in this respect; indeed housing is, if anything, linked to positive externalities (see Rohe et al. 2000; McCarthy et al. 2001).
2. The duty does not achieve an obvious redistribution goal; while higher income households typically pay more for housing, demand tends to be income inelastic and so the duty is regressive (see Wood 1994).
3. Stamp duties can impede access to home ownership as it is a transaction cost that needs to be paid upfront upon purchase of a property (Bourassa & Yin 2006; Wood et al. 2003), and will adversely impact affordability because it increases the price of housing.
4. Those who move more frequently pay relatively high amounts of duty, while the duty also deters the transfer of property from lower value uses to higher value uses and results in an inefficient allocation of resources.

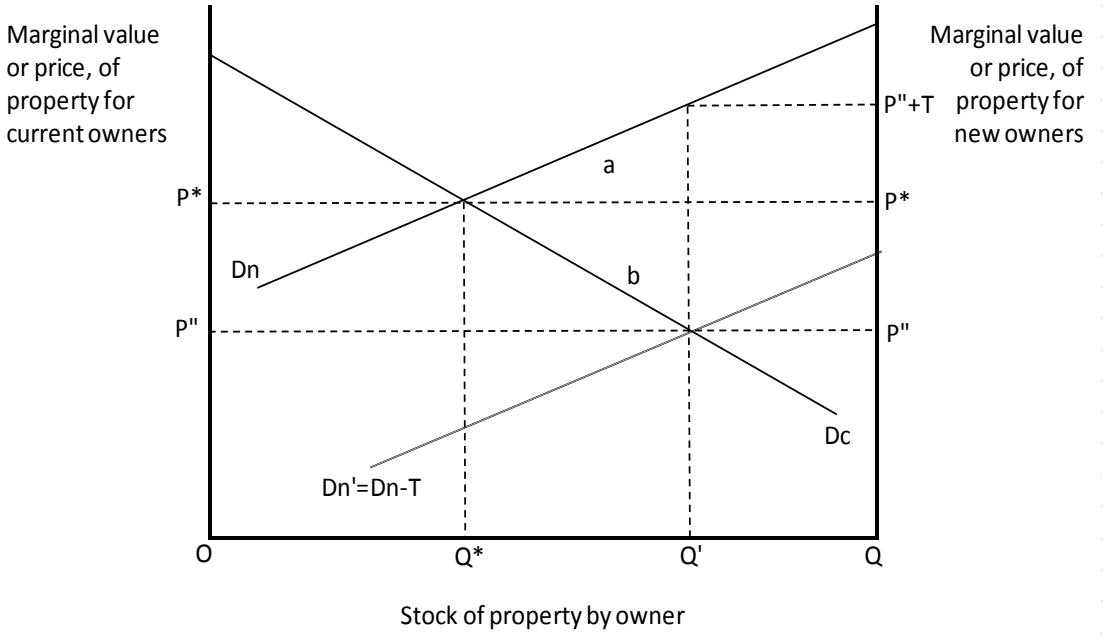
Figure 1 (based on Freebairn 2010) illustrates the last of these objections where it is assumed that a fixed number of (identical) houses are currently owner occupied by their owners ('insiders'). If these identical houses were auctioned the demand curve $D_c$ shows the prices that owners would be willing to bid. $D_c$ is drawn with respect to the left hand vertical axis, and so current owners are ranked from highest to lowest in terms of price bids. The curve $D_n$ is the demand curve of potential newcomers and is drawn with respect to the right hand vertical axis. Where the curves $D_c$ and $D_n$ intersect establishes the market price of housing at P* and the allocation of housing between current owners and newcomers. Newcomers value the units of housing Q* - Q more than do current owners and will be displaced as the insiders with valuations

[2] A summary is offered at the end of this section.

below P* accept higher offers from newcomers. The market will then establish a division between insiders and newcomers at Q*.

But consider a duty of T per housing unit transaction that is paid by newcomers on purchase. If all newcomers have the same expected holding period, so that T is amortised over the same number of years, there will be a parallel downward shift in the demand curve from $D_n$ to $D_n$-T. A new division of the stock at Q' is established, with a lower volume of transfers Q'-Q, and a higher market price P"+T so housing becomes more unaffordable. Though the units Q*-Q' are valued more by newcomers than insiders, the duty stops their transfer. Some potential newcomers are then locked out; their predicament could have adverse consequences for labour mobility, and may result in longer commutes. The value of these efficiency losses is given by the areas a and b in Figure 1.

**Figure 1: Conveyance duty distortions**




$D_c$ = Demand curve for current owners
$D_n$ = Demand curve for potential new owners
Q = Total quantity of stock of property
T = Duty per housing unit transaction paid by new owners on purchase
Q* = Division of property between current and new owners in the absence of T
P* = Marginal value of property to both current and new owners in the absence of T
Q' = Division of property between current and new owners when duty T is introduced
P" = Price received by current owners when duty T is introduced
a+b = Efficiency losses as a result of T

## 2.2 Theory of tax incidence—land tax

Under present land tax arrangements tax incidence is distortionary because land used for owner occupied housing (and primary production, as well as certain other uses such as education) is tax exempt, while land used for private rental housing (and commercial or industrial uses) is subject to the tax. The tax is also applied to the cumulative unimproved value of land so that single property owners typically have a small or more often zero tax liability, while multiple property owners have relatively high tax burdens. This tax base is the source of diseconomies of scale that are a

barrier to the attraction of wholesale sources of private finance (superannuation funds, for instance) into the private rental housing market (see Wood et al. 2010).

We begin the formal analysis by considering the incidence of land tax under *current arrangements*. When a tax is applied conditional on the use of a factor input (land, labour or capital) in production, the resource will flow out of the types of production that are taxed and into the untaxed uses. This is because the after-tax returns in the taxed use decline on introduction of the tax; the resource transfer continues until the after-tax returns are equalized. In a housing market where land can be used for rental or owner occupied housing, the taxation of the former will then result in a contraction in the supply of rental housing, as some rental investors seek higher returns elsewhere, and an increase in rents.

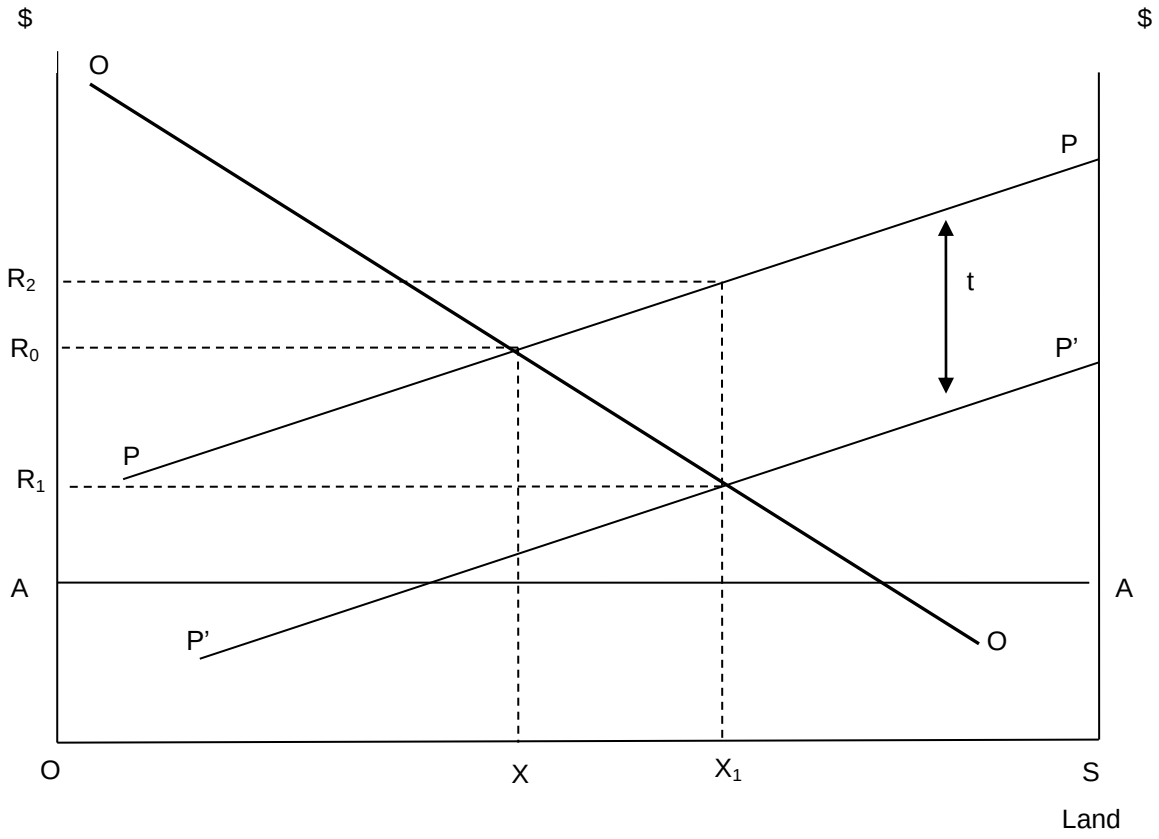
Figure 2 illustrates in the case of a land tax where it is assumed that 'raw' land has only two uses—the production of housing for purchase by home buyers, or alternatively the production of housing that is purchased by landlords (and subsequently leased to tenants)[3]. There is a *fixed amount of land* measured on the horizontal axis from O to S; rents are measured on the vertical axis[4]. Land used by producers of housing for owner occupiers (rental housing) is measured along the horizontal from left to right (right to left), and beginning at O (S). Denote OO as the demand for land from producers (developers) of owner occupied housing; as the amount of land used increases the rent they are prepared to pay owners of land declines (since in order to attract more home buyers they must drop the price of new housing). PP is the demand for land from producers (developers) of rental housing; again the demand curve is downward sloping. Owners of land have a fixed reservation rent equal to A, which can be thought of as its value in agricultural use. In a market where land is not taxed, producers will compete and out-bid each other until the rents they are prepared to pay for the last unit of land used are equal at $R_0$. This equilibrium rent occurs at X, with OX (SX) land used by producers of owner occupied (rental) housing.

Suppose a flat tax t per unit (e.g. square metre) of land is imposed on land used for rental housing but a tax exemption is granted for land that has been purchased for the construction of housing purchased by home owners. This reduces the rent received by landowners (who formally pay the tax) from producers of rental housing by t, so they begin to lease more land to the developers of owner occupied housing until (after-tax) rents are equalized at $X_1$. The pre-tax rents $R_2$ paid by developers of rental housing is higher, and the amount of land used for production of rental housing shrinks from X to $X_1$.

[3] The analysis draws on Evans (2004, Chapters 2 and 17).

[4] In a perfectly informed market without frictions such as transaction cost, the capital value of land will equal the present value of rents. As Oates and Schwab (2009, p.55) point out a land tax can be applied to land rents or land values, and every tax rate on land rents can be expressed as an equivalent rate on land value that generates the same tax revenue. It does not therefore matter whether the analysis is conducted in terms of rents or land values.

**Figure 2: Distortionary land tax**



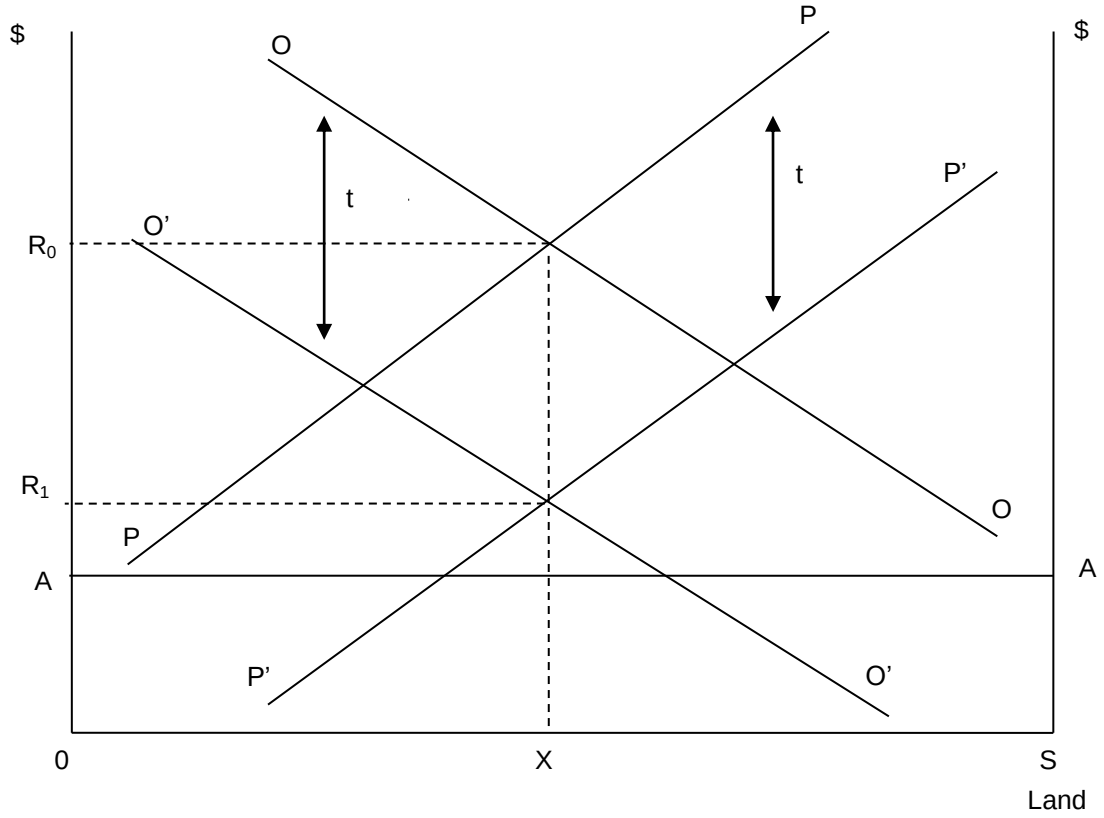

S = Amount of land (fixed)
A = Reservation rent of land owners (value in agricultural use)
OO = demand for land from producers of owner occupied housing
t = flat tax per unit of land on land for rental housing
PP = demand for land from producers of rental housing when land for rental housing is not taxed
P'P' = demand for land from producers of rental housing when land for rental housing is taxed
$R_0$ = Equilibrium rents when land is not taxed
$R_1$ = After-tax rents received by land owners
$R_2$ = Pre-tax rents paid by producers of rental housing
X = Division of land between producers of owner occupied and rental housing when land is not taxed
$X_1$ = Division of land between producers of owner occupied and rental housing when land for rental housing is taxed but land for owner occupied housing is tax exempt

This formal analysis underpins claims that current land tax arrangements harm the supply of affordable rental housing[5]. But it is also the theoretical foundation for important claims about the impact of land taxes on land prices. The capital value of land will reflect the future stream of rents suitably discounted so as to convert future rents into present values. In an efficient market with perfect foresight land prices will equal the net present value of the future stream of after-tax rents (see Henry et al. 2009, pp.248–50; Oates & Schwab 2009, pp.52–53). In the new equilibrium illustrated in Figure 2 the producers of owner occupied housing pay rents equal to $R_1$; the producers of rental housing pay higher pre-tax rents $R_2$ but the after-tax rents received by landowners is again $R_1$. The post-tax equilibrium rents received by landowners are lower than $R_0$ the pre-tax equilibrium rents. These lower rents will be capitalised into lower land prices. For proponents of a land tax these capitalisation effects are an attractive attribute.

[5] As the Henry Review points out there are other harmful arrangements such as a tax base defined to include the aggregate value of all land holdings.

But under *current arrangements* illustrated in Figure 2 only part of the land tax burden is shifted back to landowners; the rest is borne by tenants as competition between developers will result in forward shifting into the rents paid by tenants. A broad based land tax that is uniformly applied avoids the distortionary effects that result from the current non-tenure-neutral provisions, and leaves tenants unaffected according to the analysis taken up in Figure 3.

**Figure 3: A broad based land tax**




S = Amount of land (fixed)
A = Reservation rent of land owners (value in agricultural use)
t = flat tax per unit of land on all land
OO = demand for land from producers of owner occupied housing when land for owner occupied housing is not taxed
O'O' = demand for land from producers of owner occupied housing when land for owner occupied housing is taxed
PP = demand for land from producers of rental housing when land for rental housing is not taxed
P'P' = demand for land from producers of rental housing when land for rental housing is taxed
$R_0$ = Equilibrium rents when land is not taxed
$R_1$ = After-tax rents received by land owners
X = Division of land between producers of owner occupied and rental housing when land is not taxed, as well as when all land is taxed at a flat tax t

A broad based tax that applies a flat per unit tax t uniformly to both land occupied by rental and owner occupied housing is illustrated in Figure 3. The respective demand curves OO and PP shift downward by the amount t. As Figure 3 demonstrates a parallel shift in both curves of distance t leaves the amount of land used by developers of rental and owner occupied housing unchanged, and the rents paid by developers are also unchanged. As both must pay the same tax, the rents they are willing to pay owners of land will stay the same, *all else remaining constant*. A broad based tax is tenure neutral according to this static analysis. The tax burden is shifted

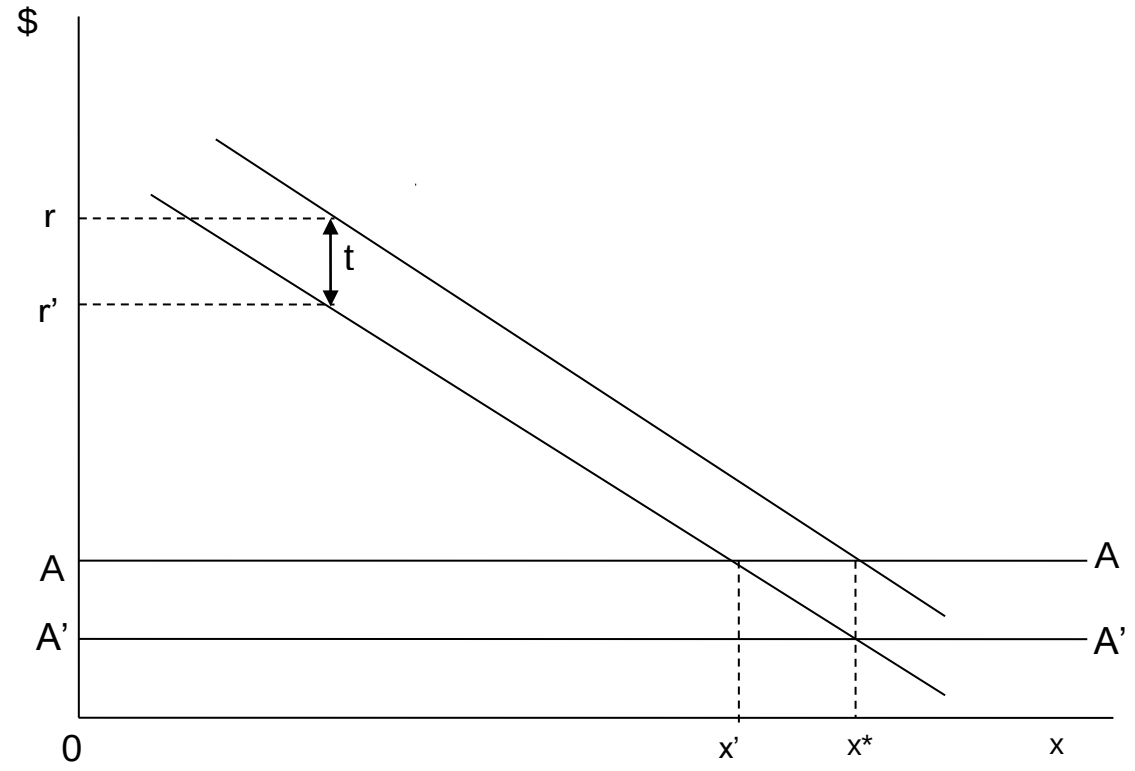
to landowners who receive lower after-tax rents $R_1$ that will be capitalised into lower land prices. This is clearly an appealing outcome from the perspectives of all but landowners at the time the tax is introduced. Developers are unaffected because they continue to pay the same for land as before the tax, and if the industry is competitive, the entire tax will be shifted backward to landowners rather than forward to home buyers and tenants. As the after-tax rents received by landowners fall by t the value/price of land will fall by the discounted present value of the future stream of tax liabilities. There are potentially important implications for the affordability of rental housing. As compared to present arrangements (see Figure 2) the supply of private rental housing expands (from S-$X_1$ to S-X) and the fall in pre-tax land rents ($R_2$ to $R_0$) will (if markets are competitive) be shifted forwards, thereby lowering the housing cost burdens of tenants.

But these outcomes are subject to caveats. AA is assumed to be a fixed reservation rent that landowners are willing to accept. As a number of authors have argued (Evans 1983, 1986; Wiltshaw 1985, 1988; Neutze 1987) landowners differ in their degree of attachment to the land. Farm owners wishing to retire, or executors of land where the owner has died may be prepared to sell for less than even its value in agricultural use. Others may have a strong attachment, perhaps because the land has been in family ownership for generations, and are unwilling to sell even at prices that exceed those that developers are prepared to pay. In these circumstances owners will have different reservation rents, and instead of their supply curve being represented by the horizontal line AA, it will be upward sloping (if we describe the supply curve from left to right). As Evans (2004, p.226) shows the desirable tenure neutrality properties of a broad based land tax will no longer hold. The fixed reservation rent assumption is then critical.

## 2.3 A broad-based land tax and urban form

Provided a land tax is broad-based such that there are no exemptions, it will have no impact on the size of cities or their density. Figure 4 (based on Brueckner 2007) illustrates this in a setting where the fixed supply of land assumption is relaxed, but we retain the assumption of a fixed rent for land in agricultural use (A in Figure 4). The origin is used to represent a city's central business district (CBD) where all employment is assumed to be located, and land at increasing distance from the CBD (x) is measured along the horizontal. It is assumed that land can be assigned to alternative uses in a market setting where transaction costs are zero and capital markets are perfect. There is also a featureless topography. As households must be compensated for commuting, house prices decline with distance from the CBD, and rivalry between developers in a competitive building construction industry will ensure that rents per unit of land (r in Figure 4) paid by developers also decline with distance. A fixed land tax t with shift the land-rent curve down to r', but it will also lower the fixed rent of land in agricultural use by the same amount (from A to A'), leaving the city boundary unchanged at x*. At the city boundary the land tax will be the same regardless of whether the land is developed for urban use or remains in agricultural use, and so the introduction of land tax will not affect the landowner's decision. But the after-tax land rents received by landowners fall by t, and land values will also fall by the capitalised value of t.

**Figure 4: A broad based land tax and urban form**




0 = CBD
x = Land at increasing distance from the CBD
t = Flat tax per unit of land
A = Reservation rent of land owners (value in agricultural use) in the absence of a land tax
A' = Reservation rent of land owners (value in agricultural use) when land is taxed at a flat tax t
r = Rents per unit of land in the absence of a land tax
r' = Rents per unit of land when land is taxed at a flat tax t
x* = City boundary when land is not taxed, as well as when all land is taxed at a flat tax t
x' = Potential city boundary when land in agricultural use is tax exempt

The proposition that city boundaries are unaffected by a broad based land tax breaks down if exemptions are granted. Suppose, for example, that land in agricultural use is exempt. Developers can no longer outbid farmers for the land between x* and x' with the result that this land is returned to rural use. But the supply of housing will contract, and (all else unchanged) housing prices will increase throughout the city causing developers to compete more forcefully as profits increase. The land-rent curve will shift back upwards establishing a new city border somewhere between x' and x*. Thus a land tax that exempts agricultural land will reduce the city's 'urban footprint' by increasing density; commutes will be over shorter distances but house prices will be higher, and in response dwelling sizes will be smaller and if regulations permit, building heights will rise.

## 2.4 Summary

Stamp duty is an unpopular tax with economists because it does not achieve an obvious redistribution goal and impedes the efficient allocation of resources between competing uses. The duty raises the price of housing with the consequence that housing is less affordable. It will also tighten borrowing constraints, making

homeownership less accessible. Its resilience may well reflect its importance as a source of tax revenue for state governments.

Under present land tax arrangements tax incidence is distortionary, because land used for owner occupied housing (and primary production, as well as certain other uses such as education) is tax exempt, while land used for private rental housing (and commercial or industrial uses) is subject to the tax. In a housing market where land can be used for rental or owner occupied housing, the taxation of the former results in a contraction in the supply of rental housing, as some rental investors seek higher returns elsewhere, and an increase in rents. Thus the current land tax arrangements harm the supply of affordable rental housing, and this is aggravated by its application to the cumulative unimproved value of land that impedes attraction of private finance (from superannuation funds, for instance) into the private rental housing market.

These unsatisfactory tax arrangements prompted the Henry Review's advocacy of a broad based land tax that could avoid the distortionary effects that result from the current non-tenure-neutral provisions, and leaves tenants (and *home buyers*) unaffected because the effective incidence is shifted back onto landowners (at the time the tax is introduced). This is clearly going to be an attractive outcome from the perspective of all but current landowners. If agricultural as well as other uses of land are subject to the tax, the boundary of cities and their density will be unaffected. However, if agriculture is given a tax exemption the tax will reduce a city's 'urban footprint' by increasing density; commutes will be over shorter distances but house prices (and rents) are higher, and in response dwelling sizes will be smaller and if regulations permit, building heights will rise.

The next section marks the start of our empirical analysis by describing the data sources, measurement issues and policy simulation modelling approach we have invoked to estimate the Henry Review reform's likely impacts.

# 3 METHOD

The analysis exploits two datasets obtained from the Office of the Victorian Valuer-General (VG). The following section describes the key features of the data sources. This is followed by a description of the sample design, including identification of data limitations and sample exclusion rules. Methods for imputing land values based on sales and valuations data are outlined. Finally, we detail the methodology that has been employed to arrive at a revenue neutral land tax schedule that broadly aligns with the principles outlined under recommendations 51 to 54 of the Henry Review (2009).

## 3.1 Data

Two main data sources are exploited in this report. These are: (i) property valuations data (supplied in a confidentialised format) and (ii) property sales data.[6] These are described in detail below.

### *3.1.1 Property sales data*

The first raw data source is the property sales data; it consists of one file for each year and residential property type (house, land, units/apartments). Property sales data is collected at the time of sale for taxation purposes, in this case stamp duties. Being records of sale, a property may appear more than once if it is sold multiple times. It may also not appear at all because it has not been sold during the period. The sample period covered by the sales data spans the years 1990–2010, though our interest centres on sales that occurred in the year 2006.The residential property sales data contains the following information:

- property address
- municipality
- sale price
- date of sale
- sale type (house, unit/apartment, vacant land).

The property sales dataset is used to estimate the amount of stamp duty that would be foregone if stamp duties are abolished, as recommended by the Henry Review. Since a broad-based land tax is levied on all land, not just that subject to property transactions, a merged dataset is designed that links corresponding records in the property sales and valuations datasets (see Sections 3.1.2 and 3.1.3 below). There is a *caveat* as neither data set allows us to distinguish between owner-occupied dwellings and rental dwellings[7].

### *3.1.2 Property valuations data*

The second raw data source is 2008 property valuations data collected by individual municipalities for the purposes of levying property rates (taxes)[8]. The valuation records for each rateable property comprise descriptions of the use of the land and

[6] This database was developed under AHURI project 30590 to analyse land use planning policies.

[7] However, while there are differences in the thresholds in the 2006 and 2010 stamp duty schedules, the tax rates are similar across the two years, rising from a marginal rate of 1.4 per cent in the lowest bracket to 6 per cent in the second highest tax bracket, and then culminating at 5.5 per cent of total property price in the highest tax bracket.

[8] At the time of conducting the analyses the 2008 valuation records were the most recent available. Valuations are undertaken every two years.

improvements (with the term 'improvements' referring to the presence of buildings); and information on the last sale date. Valuations are audited at the state level by the Victoria Valuer-General to ensure consistent property valuations. The data is confidentialised via the removal of some fields like owner details and unimproved site values. The dataset is a point–in-time record of all rateable properties as at 2008: each property should appear, but can appear only once.

The valuations data performs two key functions. First, we employ it to estimate land tax assessments under the Henry Review's proposed reforms. Secondly, the valuations data contains property characteristics that assist in detailed analysis of the impacts of the proposed land tax. These include:

- last sale date
- last sale price
- land use classification (residential, commercial, industrial, agricultural)
- land use classification code (a more detailed description of the use of the property, following a standard coding framework for valuers)
- land size
- dwelling size
- number of bedrooms
- year of construction
- construction material.

Spatial variables were also added to the Valuation data using VicMap spatial reference datasets that allow important analyses of the spatial incidence of taxes and duties. These include:

- X and Y coordinates, which represent the location of the property on a map.
- Distance from designated principle and major activity centres.
- Distance from railway stations.
- Zoning codes that regulate land use.
- Overlays that identify neighbourhoods with land and buildings that have idiosyncratic characteristics, for example, environmentally significant landscapes or clusters of historical buildings. Areas and properties subject to overlays must comply with additional restrictions on the use of land and/or the design of buildings; for example, a permit is required to remove vegetation in environmentally significant areas.

While rich in property and spatial variables, the valuations dataset does have some limitations. Firstly, it does not contain land size information for apartments and flats (the bulk of which are strata titled units) and we are therefore unable to estimate land tax liabilities for flats and apartments. Secondly, and more obviously, the actual valuations including unimproved site values, have been removed with the implication that these values must be estimated for 2006 (see Section 3.2).

To ensure consistency in our sample we have also omitted flats and apartments from the calculation of stamp duty foregone. Land tax is computed differently for strata titled units[9], presenting further potential complications. Flats and apartments remain a

[9] For strata titled properties the unimproved site value is currently calculated as the total value of the site (i.e. the block the apartment building is on); minus the value of the building. For each unit/apartment

relatively small part (around 20% of total dwellings) of the housing stock, even in a city like Melbourne with a relatively large population by Australian standards; so the analysis nevertheless covers most of the residential housing sector. A second data limitation is the absence of unimproved site values for confidentiality reasons[10]. It has been imputed for each residential land plot and parcel, as explained below.

### *3.1.3 Merged dataset*

The property sales and valuations datasets are linked together via the use of property identifier fields (addresses) that are available in both datasets. The records are then matched to unit-record spatial information, based on a spatial reference database (VicMap). Each 2006 transaction in the property sales dataset can then be matched to key property and spatial characteristics in the valuations dataset, such as location in relation to principal and major activity centres (areas designated by planning authorities as focal points for employment growth, transport nodes and urban amenities), and planning regulations. Other planning regulations are captured by identification of zoning and overlay areas[11].

Both the valuations and sale information are collected for the purposes of revenue collection and as a result offer a high level of coverage and reliability. Those collecting the information have an interest in accuracy and completeness of coverage, since it is used to collect stamp duties, land taxes and local government rates. Subject to the caveat concerning flats and apartments, the analysis can claim to be based on the 2006 *population* of residential housing market transactions, rather than a sample, and the same attribute can be claimed for the analyses of land tax using the valuations data. The valuations should represent a population of residential properties (houses and land). The fact that unimproved land values and total property valuations have been removed is a limitation which we address through imputations based on the available data.

The Victorian State Government introduced different principal place of residence (PPR) rates of stamp duty to those purchasing a primary home and non-PPR rates that apply to investors. Data limitations at the time our study began meant that we were restricted to use of 2006 data, and use of contemporaneous schedules that are applied uniformly allows us to side-step this issue. However, it is a qualification regarding our results because current stamp duty arrangements do include these different rates of duty and so our revenue and incidence estimates will differ from those that would eventuate under current (2010) duty provisions.

## 3.2 Sample design

The 2006 raw sales dataset was used to estimate the total stamp duty revenue generated for that year. The sample data was limited to residential sales within metropolitan Melbourne as we are principally interested in the impacts of the proposed reforms on residential housing rather than commercial or other properties. Therefore, any vacant land or property sales that classified as in non-residential use or outside of metropolitan Melbourne were removed from our data sample. The raw sales data also contained duplicate sales records (two or more records of the same sale); data records were pruned to leave only one record for each 2006 sale. Our final sample comprises residentially classified vacant land plots and houses within metropolitan Melbourne, amounting to around 68 400 transaction records.

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owner, the unimproved site value of their property is a share of the total value based on the unit entitlement of each unit.

[11] The overlay boundaries are identified using VicMap database 2010 version.

As explained in Chapter 2 spatial analyses required matching of the 2006 sales data with the valuations data on the address variable. Overall, approximately 75 per cent of the sales records were successfully matched with their corresponding valuation record. Houses were more successfully matched than vacant land transactions, with 82 per cent of all house transactions matched to a valuation record but a lower 36 per cent of all vacant land sales—most of which are in growth areas. Matching is more difficult for land parcels because they do not have a corresponding house number in the address field. A consequence is that our stamp duty analyses will under-represent transactions in vacant land in the growth areas of the urban fringe. However, this issue is of limited significance because established property sales account for a large majority (80%) of total transactions.

A second sample design is employed for the creation of a broad-based land tax schedule. It selects the valuation records of all residential land plots in Melbourne municipalities. This means that all non-residential properties and flats (strata titled units) were removed from the data sample. Missing data on land area also forced the exclusion of 6709 records (0.4%) for this reason. In addition, concern about extreme values prompted trimming of the top and bottom 1 per cent of the of the data sample with respect to land size. The purpose of this was to remove any records with extreme land area values. In the bottom 1 per cent of the land size distribution, land area ranged from 0 to 123 square metres. In the top 1 per cent of the land value per square metre distribution, land values ranged from 4113 square metres to $117 700 000 per square metre. This 1 per cent clearly contains extreme values because it contains either implausibly large land values or a value of zero. For the same reason, we also removed the bottom 1 per cent of the sample with respect to land value per square metre from the sample, which ranged from 38 per square metre to 97 per square metre. This reduced the final data sample to 1 136 000 records, which amounts to a loss of 40 per cent of the initial sample.

## 3.3 Imputation of land values

Land tax is levied on unimproved site value of properties. Principle places of residences are exempt from land tax but are still valued for the purposes of local property taxes (rates). The simulated tax schedules will also be based on unimproved site value, but on a per-square-metre basis. The valuations dataset originally contains this field for each property, being estimated by municipal valuers. It is however removed from the confidentialised dataset available for the research. Unimproved site value is a critical variable in our analysis as the Henry Review proposes measuring the land tax base on an unimproved land value per square metre basis.

For vacant land sales in 2006 the unimproved site value per square metre is taken to be the sale price divided by the property size in metres. For other record types, we employ three imputation techniques. The first takes sales of vacant land recorded in the VG data base 1990–2010 and inflates (deflates) their recorded sales price using municipality-level land-price indexes. We designed the land price index by calculating the annual median land sales price for every municipality and dividing it by annual median sales prices in year 2006, which has an index equal to one. For municipalities with no sales records in certain years, we took the average of the median annual land sales prices for adjacent municipalities and used this figure to calculate the index for those municipalities. Vacant land sales in years other than 2006 were inflated (deflated) using this land-price index.

Secondly, transaction price details for houses sold over the period 1990–2010 were also employed to impute unimproved land values. In their case house prices were adjusted to 2006 values using the same land-price indexes. Then the value of

improvements as recorded in the 2008 property valuations data was subtracted to arrive at the imputed unimproved land value. A building components index is utilised to deflate improvements to 2006 values (ABS 2011).

The third imputation method estimates land values using a hedonic land value model for vacant land and houses where no transaction occurred during the period 1990–2008. A standard hedonic price model is based on the premise that a good such as land is made up of various bundles of attributes or characteristics. These include structural and neighbourhood characteristics and accessibility to various local public services. The hedonic price function for land therefore models the price of land as determined by the quality of the housing package given the pecuniary value of its characteristics. A hedonic land value model was exploited to predict 2006 land values for residential land plots and properties where no transactions were made. This was achieved by first regressing land values of actual land transactions in 2006 on a series of explanatory variables. Next, we used the regression estimates to impute the unimproved land values for all land plots and properties with no prior transaction record. Explanatory variables that were used in the regression include distance to CBD variable, distance from secondary and primary schools, land size and other relevant land characteristics (see Appendix A1 for a variable list and A2 for the hedonic land value model regression results).

There are six property types for which the unimproved site value is imputed. The methods for imputing 'unimproved site value' for each type are as set out in Table 1, below. In each case the values are expressed as a square metre value, based on the land size recorded in the valuations.

**Table 1: Imputation methods for unimproved site value per square metre by record type**

| Type | Sale information | Imputation method for unimproved site value |
|---|---|---|
| Land (unimproved land parcels) | Sold in 2006 | Sale value |
| Land (unimproved land parcels) | Sold in other years (1990–2010) | Sale value inflated or deflated to 2006, using the land price index |
| Land (unimproved land parcels) | No sale records | Values are estimated based on a hedonic model |
| Houses (residential parcels sold with buildings) | Sold in 2006 | Sale value minus the value of improvements, deflated from $2008 values using the building components index |
| Houses (residential parcels sold with buildings) | Sold in other years (1990–2010) | Sale value inflated or deflated to 2006; minus the value of improvements, deflated from $2008 using the building components index |
| Houses (residential parcels sold with buildings) | No sale records | Values are estimated based on a hedonic model |

## 3.4 Design of land tax schedule

The Henry Review recommends that land tax should be levied using an increasing marginal rate schedule, with the lowest rate being zero and thresholds determined according to per square metre values. Furthermore, land taxes should be applied per land holding, not on an owner's total holding. We design a simulation model that aligns with the Review's recommendations. The model comprises two key components. The first estimates the revenue foregone in Melbourne municipalities if stamp duties and the existing land tax regime were abolished. The second designs a new land tax schedule that contains the features recommended under the Review,

and is revenue neutral. The new land tax schedule is then designed to just compensate for the loss of revenue through abolition of stamp duty and land tax under the current regime.

### *3.4.1 Estimation of stamp duty and current land tax revenue foregone*

We estimate stamp duty liabilities on the values of all residential-zoned vacant land plots and houses transacted within metropolitan Melbourne in the year 2006. We utilise the contemporaneous 2006 stamp duty schedule; this has an advantage in that sale values or duty thresholds need not be transformed using index methods (a potential source of measurement error), as would be the case if we were say modelling the 2010 stamp duty schedule using 2006 transactions. On the other hand there are differences between the 2006 and 2010 stamp duty arrangements that are not captured by this simulation (see pages 14–15 above).

We are unable to distinguish between first and repeat homebuyers, so we do not model first homebuyer concessions. However, according to ABS data first home buyers accounted for around 16.7 per cent of total owner occupied housing finance commitments in 2006 (ABS 2006). Based on this proportion, we randomly assigned 16.7 per cent of our 2006 sample to be eligible to the First Home Buyer with Family exemption. Using this data sample, we found that estimates (based on the assumption that all buyers are repeat purchasers) of stamp duty foregone will only overestimate losses in revenue by around $4 million or 0.32 per cent[12].

We estimate that $1.29 billion of revenue would be lost through abolition of stamp duty. According to the Commonwealth Grants Commission (2007), state-wide non-principal residential land generated $279 million in 2006. According to population weighted household estimates from the Household, Income and Labour Dynamics in Australia Survey, 77.5 per cent of private renter dwellings in Victoria are located in Melbourne[13]. This suggests a revenue loss of only $216 million due to abolition of the current land tax regime. The total revenue foregone would therefore be $1.5 billion.

### *3.4.2 Land tax schedule parameters*

Land value thresholds are set so as to raise enough revenue to compensate for loss of stamp duty and current land tax revenue, which amounts to $1.5 billion. The land tax schedule requires specification of the following key components: number of tax brackets, tax base measure, tax thresholds, land area and tax rates. We describe how we have derived each component in turn below.

With regards to the number of tax brackets, we assume that there will be seven land tax brackets under the new land tax system, exactly the same number of tax brackets as under the current 2006 land tax system. The Henry Review made no recommendations on the number of tax brackets. We have adopted the same distribution of land plots across tax brackets as under current arrangements so as to minimise the number of changes that are required outside the key recommendations specified by the Review. Retaining a tax structure that taxpayers are familiar with should aid transparency. The tax base is measured on land values per square metre

[12] The amount of stamp duty revenue foregone by omitting these concessions is small given that the Victorian first home buyer concession with respect to stamp duty only applies to first home buyer families that purchase property valued at a very low threshold of $150 000 or less.

[13] The Household, Income and Labour Dynamics in Australia Survey was initiated and is funded by the Australian Government Department of Families, Housing, Community Services, and Indigenous Affairs (FaHCSIA) and is managed by the Melbourne Institute of Applied Economic and Social Research (MIAESR). The findings and views reported in this report, however, are those of the authors and should not be attributed to either FaHCSIA or the MIAESR.

and levied on each land plot (rather than the cumulative value of land plots owned by the same taxpayer), in keeping with the Henry Review's recommendations.

To design tax thresholds we begin by ranking land plots from the lowest to highest land value. We then assign land plots to each of the seven tax brackets of the current land tax schedule. The number of plots within each tax bracket is reported in Table 2. If the current land tax schedule *were applied as a broad based tax*, it would be levied on over 1 million land plots. Approximately 30 per cent of land plots have aggregate land values under the $200 000 tax exempt threshold; owners of these land plots pay zero land tax. Over half of land plots would be in the second lowest tax bracket. The proportion of land plots declines at higher tax brackets with less than 0.1 per cent in the highest tax bracket, where land values are over $2.7 million per land plot and the marginal tax rate is 3 per cent.

**Table 2: Number of land plots in each tax bracket assuming the current 2006 land tax schedule is a broad based tax**

| 2006 current bracket | Threshold on aggregate land value basis | Frequency | Per cent |
|---|---|---|---|
| 1 | Less than $200,000 | 305,166 | 29.5% |
| 2 | $200,000 to less than $540,000 | 593,904 | 57.5% |
| 3 | $540,000 to less than $900,000 | 104,152 | 10.1% |
| 4 | $900,000 to less than $1,190,000 | 19,197 | 1.9% |
| 5 | $1,190,000 to less than $1,620,000 | 6,907 | 0.7% |
| 6 | $1,620,000 to less than $2,700,000 | 3,075 | 0.3% |
| 7 | $2,700,000 and over | 790 | 0.1% |
| Total | | 1,033,191 | 100.0% |

Having estimated the distribution of land plots across tax brackets, we then re-rank all land plots from lowest to highest value using the Henry Review's proposed tax base measure of land value per square metre, and solve for the new thresholds that assign exactly the same number and proportion of land plots to each tax bracket as under the current land tax schedule. These alternative Henry Review land tax thresholds are reported in Table 3.

**Table 3: Proposed land tax thresholds**

| Proposed bracket | Proposed land tax threshold in $ per square metre | Frequency (from column 3 in Table 2) |
|---|---|---|
| 1 | Less than $286.54 | 305,166 |
| 2 | $286.54 to less than $974.46 | 593,904 |
| 3 | $974.46 to less than $2,000.22 | 104,152 |
| 4 | $ 2,000.22 to less than $3,025.30 | 19,197 |
| 5 | $3,025.30 to less than $4,145.28 | 6,907 |
| 6 | $4,145.28 to less than $5,697.08 | 3,075 |
| 7 | $5,697.08 and over | 790 |
| Total | | 1,033,191 |

To illustrate what they would mean for the typical homeowner consider houses on land plots of 400 square metres. Provided its assessed unimproved land value is less than $286.54*400 = $114 400 (at 2006 prices), the owner will pay zero land tax. On the other hand, a 400 square metres property with assessed unimproved land value in

excess of $5697.08*400 = $2.3 million would be subject to the highest tax rate under the proposed schedule. However, the actual amount of tax will also be dependent on the size of the land plot. For example, consider two land plots; one with an area of 400 square metres and another half its size at 200 square metres. Suppose we hold the land value per square metre constant at $500 per square metre. Both land plots would fall into the second lowest tax bracket as a result of their land value per square metre. However, the 400 square metres plot would incur a land tax liability that is twice that of the 200 square metres plot. We therefore present below the weighted average land value per square metre in each tax bracket where the *weight* is the size of the land plot relative to all land in the tax bracket.[14]

As shown in the Table 4 below, the weighted average land value rises from $198 per square metre in the lowest bracket (zero tax rate) to over $8000 per square metre in the highest bracket. It is clear that higher tax rates will be levied on more expensive land. However, the land area covered by each tax bracket declines steeply from the second lowest tax bracket onwards. Moreover, 287 million square metres of land area or 39 per cent of total area is tax exempt, significantly higher than the 29.5 per cent that would be tax exempt if the current land schedule were applied as if it were a broad based tax (see Table 2). Over half of total land area would be in the second lowest tax bracket, declining to only 7 per cent in the third bracket and less than 1 per cent from the fourth tax bracket onwards.

**Table 4: Land value per square metre and aggregate land area, by proposed tax threshold**

| Proposed bracket | Proposed thresholds in $ per square metre | Weighted average land value in $ per square metre | Aggregate land area | |
|---|---|---|---|---|
| | | | square metre | % of total aggregate area |
| 1 | Less than $286.54 | $198.48 | 286,560,911 | 38.5% |
| 2 | $286.54 to less than $974.46 | $498.98 | 396,350,756 | 53.2% |
| 3 | $974.46 to less than $2,000.22 | $1,285.70 | 53,122,932 | 7.1% |
| 4 | $ 2,000.22 to less than $3,025.30 | $2,392.14 | 6,024,032 | 0.8% |
| 5 | $3,025.30 to less than $4,145.28 | $3,479.58 | 1,654,250 | 0.2% |
| 6 | $4,145.28 to less than $5,697.08 | $4,696.77 | 594,911 | 0.1% |
| 7 | $5,697.08 and over | $8,162.75 | 169,070 | 0.02% |
| Total | | | 744,476,826 | 100.0% |

The next step finds marginal tax rates that begin at zero in the lowest bracket and are then increasing in square metre land values. A solution is sought subject to the revenue constraint that land tax revenue under the proposed regime be $1.5 billion. The resulting land tax parameters are a revenue neutral version of the Henry Review recommendations.

Solving for new land tax rates presents a problem that can be addressed via linear programming. Linear programming is a computational tool for obtaining optimal solutions to achieve a specified objective subject to some underlying constraints. It is

[14] As measured by the size of the land plot divided by the total land area in that tax bracket.

commonly used for solving management or production decision problems subject to resource constraints. For example, a typical example might be finding the optimal number of labour hours to maximize output subject to the constraint that the amount of labour employed per week must not exceed 40 hours. Hence, the constraint is defined by an inequality that labour hours per week ≤ 40 hours. As implied by the name, this programming can only be employed in situations where the objective function and constraints are both linear (Hirschley 2008). In the present context, we use linear programming to obtain new land tax rates that achieve aggregate revenue of $1.5 billion under constraints that require tax rates to be increasing up the tax brackets.

The set of equations we have formulated to specify our objective functions and inequality constraints are set out in Appendix A3. We solve for the new tax rates computationally using a linear programming function in Excel called Solver. We are able to obtain two sets of tax rates. The first set imposes the additional constraint that tax rates rise by a constant amount as we move up the tax brackets, i.e. the difference between the rates in bracket *i*+1 and bracket *i* is constant. The second set allows for tax rates to rise more steeply in higher tax brackets. Both sets of tax rates are reported in the next chapter of the report.

## 3.5 Capitalisation of land tax liabilities into land values

As land is immobile and its supply fixed, existing landowners bear the burden of a broad-based land tax in the form of a reduction in land values (see Chapter 2). Assuming an infinite property life and a 2006 pattern of land taxes that remains constant in real terms, discounting the stream of land taxes to infinity at a suitably chosen real discount rate allows estimation of the decline in real land values as a result of the capitalisation of land taxes (see Henry Review, p.248). The estimated fall in land values if taxes are fully passed on into lower land values is analysed spatially across the Melbourne metropolitan area, as well as with respect to a range of property variables such as land size, year of construction etc.

An important issue is choice of an appropriate real discount rate. Capitalisation effects have been a particular interest for researchers examining the impacts of property taxes on property values. For example, both Oates (1969) and Rosenthal (1999) estimated the impacts of local property taxes on property values in the US and UK. Both assume a constant stream of annual returns to the property; the former employed a real discount rate of 5 per cent and the latter 3 per cent. The Victorian state government recommends a real discount rate of 6 per cent in economic appraisals (Department of Infrastructure 2005) and it is the 6 per cent rate that we adopt as our database covers land plots in Victoria.

Note there are several important assumptions we make in the capitalisation analysis. First, we assume that 100 per cent of the present value of land taxes are capitalised into land values. This assumption can be challenged as pointed out in Section 2.4. Second, the capitalisation impacts are measured on a ceteris paribus basis that assumes no other taxes, other taxes including stamp duties, remain unchanged and that there are no interactions between land taxes and the Federal taxation system.

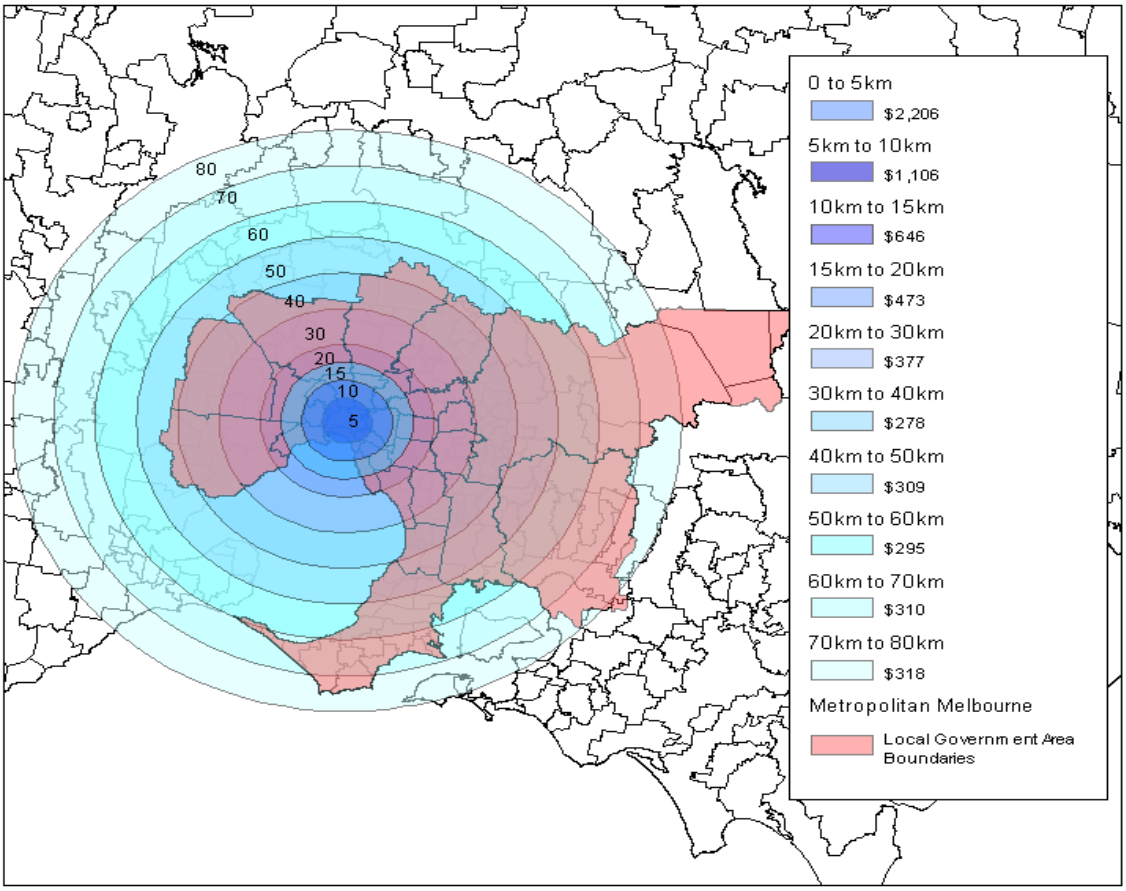
# 4 DESCRIPTIVE STATISTICS

This section reports descriptive statistics that give a sense of how land values vary across the metropolitan area. This is important to appreciate because the Henry proposals are intended to tax expensive land more heavily than cheaper land. We illustrate how this is achieved by a series of calculations that show how the tax liabilities payable by the hypothetical owner of a 400 square metres plot of land will vary with land values.

## 4.1 Residential land values in metropolitan Melbourne

From the Valuation records we find that in 2006 there were just over one million residential land plots located within municipalities belonging to the Melbourne statistical division. Figure 5 maps land values per square metre across the metropolitan area. It offers a vivid picture of their systematic decline as we move further away from the CBD, and confirms the anecdotal impression that land is cheap on the urban fringe, but as we converge on the city centre land becomes progressively more expensive. A tax base defined by land values per square metre basis will concentrate the formal incidence of land taxes on the more expensive industrial and commercial areas and suburbs within and surrounding the CBD. We can expect capitalisation effects to be corresponding higher near the CBD.

**Figure 5: Map of land values per square metre by distance from CBD**[15]




[15] Map contains the average land values per square metre within each concentric distance ring from the CBD.

Table 5 presents the number of residential land plots and amount of residential land within successive 10 kilometre rings as well as land values. The average land value of these plots was around $335 000, while on a per square metre basis, the average was $576. Competition from commercial land uses helps to push up inner city land values and also crowds out residential uses of land; only 17 per cent of all residential plots and an even smaller 12 per cent of total residential land area is to be found within 10 kilometres of the CBD. But over 50 per cent of Melbourne's residential land is found within the inner and middle ring of suburbs, that is between 10 and 30 kilometres of the CBD. Land values quickly fall off at distances beyond 10 kilometres with average values of $553 per square metre in the 10–20 kilometre ring close to the average ($576) for the metropolitan region. Given the more expensive land values in the inner suburbs and central city areas, it is unsurprising that land plots are smaller in size. For example, the average land area of plots within 10 kilometres of the CBD is 508 square metres but this then increases in a monotonic manner until it reaches 952 square metres in the 60–70 kilometre ring.

**Table 5: Land value by distance from CBD (10km)**

| Distance from CBD | Number of residential land plots (thousands) | Total residential land area (million $m^2$) | Mean land value ($ per $m^2$) | Mean land value ($'000 per land plot) |
|---|---|---|---|---|
| 0km < 10km | 174 | 89 | 1,335 | 551 |
| 10km < 20km | 348 | 238 | 553 | 365 |
| 20km < 30km | 240 | 179 | 377 | 258 |
| 30km < 40km | 131 | 107 | 278 | 196 |
| 40km < 50km | 72 | 65 | 309 | 246 |
| 50km < 60km | 29 | 27 | 295 | 238 |
| 60km < 70km | 37 | 36 | 310 | 272 |
| > 70km | 3 | 3 | 318 | 320 |
| Total | 1,033 | 744 | 576 | 335 |

Table 5 follows the Alonso-Muth-Mills model of urban form, which assumes a monocentric city with land values that decline at the same rate in all directions as distance from the CBD increases. This model has been used by economists over the years to guide empirical investigations into the pattern of land values[16]. However, it is not intended to be a realistic description of the actual pattern of land values. Hence, we report average land values again in Table 6, which lists land value measures but this time by municipality. Melbourne and Port Philip stand out as municipalities with the most expensive land; their mean land values exceed $2500 per square metre, which is a staggering 5 times the metropolitan wide average. Land plots in these municipalities are then likely to incur the highest land taxes under the proposed schedule. Boroondara, Bayside, Stonnington and Yarra also contain very expensive land of over $1000 per square metre, around twice the metropolitan wide average. On the other hand, land in the Yarra Ranges is the cheapest at only $199 per square metre. There is then a massive gap separating low land values in Yarra Ranges and the high land values in Melbourne that are over 13 times higher. Because these land value differentials correlate closely with measures of personal income, a broad based

[16] Most recently, Kulish, Richards and Gillitzer (September 2011) empirically estimate land value gradients for each Australian city assuming land values decline at the same rate in all directions from the CBD. See Figures 9 and 10 in Kulish et al. (2011).

land tax is likely to impose a relatively large tax burden on high income communities (see Chapter 5). We explore this further below.

**Table 6: Land value by municipality**

| Municipality | Mean Land Value ($ per $m^2$) | Mean Land Value ($'000 per land plot) |
|---|---|---|
| Boroondara | 1,185 | 786 |
| Bayside | 1,165 | 805 |
| Stonnington | 1,839 | 839 |
| Glen Eira | 874 | 547 |
| Monash | 572 | 404 |
| Kingston | 704 | 407 |
| Port Phillip | 2,808 | 693 |
| Moreland | 708 | 329 |
| Moonee Valley | 933 | 437 |
| Darebin | 726 | 363 |
| Whitehorse | 541 | 372 |
| Hobsons Bay | 734 | 350 |
| Mornington Peninsula | 342 | 304 |
| Manningham | 508 | 431 |
| Banyule | 478 | 340 |
| Maribyrnong | 866 | 311 |
| Yarra | 1,417 | 386 |
| Melbourne | 2,630 | 643 |
| Knox | 352 | 274 |
| Casey | 306 | 195 |
| Greater Dandenong | 380 | 231 |
| Hume | 311 | 192 |
| Frankston | 307 | 218 |
| Whittlesea | 324 | 189 |
| Wyndham | 290 | 172 |
| Brimbank | 294 | 185 |
| Maroondah | 318 | 268 |
| Nillumbik | 344 | 321 |
| Melton | 246 | 144 |
| Cardinia | 285 | 229 |
| Yarra Ranges | 199 | 196 |
| Total | 576 | 335 |

## 4.2 Stamp duty

The Valuer-General record of property transactions reveals that there were 68 937 transactions in housing *and vacant land* in 2006. Their average value was $388 800. The average stamp duty paid by purchasers of these housing and land transactions was approximately $18 900, or 5 per cent of average property prices. Because we are unable to identify transactions that were made by first home buyers in the property dataset, we cannot account for properties that were exempt from the stamp duty

requisite. Thus, we assume that all property transactions are made by repeat buyers, all of whom were subject to stamp duty levy. While such an assumption will invariably result in an overstatement of aggregate stamp duty estimates, the degree of overstatement is expected to be only marginal. As discussed in Chapter 3 of this report, we estimate that the First Home Buyer with Family exemption would account for only 0.32 per cent of the total stamp duty foregone, an insignificant amount.

**Table 7: Stamp duty liabilities 2006**

| Stamp Duty Bracket | Marginal Tax Rate (%) | Average Stamp Duty ($) | Number of Transactions |
|---|---|---|---|
| $0–$20,000 | 1.4 per cent | 142 | 24 |
| > $20,000–$115,000 | $280 plus 2.4 per cent of the dutiable value in excess of $20,000 | 2,112 | 3,147 |
| > $115,000–$870,000 | $2,560 plus 6 per cent of the dutiable value in excess of $115,000 | 16,163 | 61,593 |
| > $870,000 | 5.5 per cent | 79,353 | 3,633 |

The marginal rate schedule is progressive, rising from 1.4 per cent in the lowest bracket to 5.5 per cent of property price in the highest bracket. Over three quarters (89%) of all transactions are in the second highest bracket, where purchasers paid an average stamp duty of $16 163.

## 4.3 Land tax proposed schedule

Table 8 analyses two sets of tax rates that have been generated by application of algorithms described in Chapter 3. Each represents broad-based land tax schedules that are a revenue neutral replacement of stamp duty and current land tax, and consistent with the principles espoused in the Henry Review proposals. In the first set (Version 1) there is a tax exemption below a land value per square metre threshold of $287; marginal tax rates then rise in a linear fashion from 0.9 per cent to 1.4 per cent in the top bracket. The top marginal rate cuts in once land values (per square metre) reach $5697. As we move up the tax brackets the difference between the rates in bracket $i$+1 and bracket $i$ is constant at 0.09 percentage points. The second version has the same tax exemption threshold, but allows marginal tax rates to rise more steeply in higher tax brackets. Under Version 2, the marginal tax rate more than doubles from 1.3 per cent to 3.2 per cent between the second highest and highest tax brackets. As a result of this, the average land tax liability in the highest tax bracket is substantially higher in Version 2 than Version 1. This is counteracted however by the smaller average tax liability for land plots in the two lowest tax brackets under Version 2 compared to Version 1. In Version 1 over 50 per cent of landowners could expect to pay an average $1306 per annum (at 2006 values); it is slightly lower at $1298 under the more progressive Version 2.

Each bracket has been designed such that it captures the same number of land plots as under the current seven bracket schedule, and so the plots in each bracket will differ because of a change in the definition of the tax base. While the typical plot in the top bracket is very large (1695 square metres) it is small under the proposed schedule at 213 square metres.

**Table 8: Proposed land tax schedule, Versions 1 and 2**

| Land tax bracket | Number of land plots | Version 1 | | Version 2 | |
|---|---|---|---|---|---|
| | | Marginal tax rate | Average annual land tax | Marginal tax rate | Average annual land tax |
| Less than $286.54 | 305,163 | 0.000% | $0 | 0.000% | $0 |
| $286.54 to less than $974.45 | 593,907 | 0.921% | $1,306 | 0.916% | $1,298 |
| $974.45 to less than $2000.22 | 104,152 | 1.011% | $4,839 | 1.006% | $4,809 |
| $2000.22 to less than $3025.30 | 19,197 | 1.101% | $6,600 | 1.124% | $6,595 |
| $3025.30 to less than $4145.28 | 6,907 | 1.191% | $8,004 | 1.214% | $8,058 |
| $4145.28 to less than $5697.08 | 3,075 | 1.281 | $9,367 | 1.304% | $9,463 |
| $5697.08 and over | 790 | 1.371% | $20,342 | 3.159% | $29,927 |

To help illustrate likely land tax liabilities under the proposed reforms, we conduct a hypothetical exercise that calculates 2006 land tax liabilities in each tax bracket under the proposed land tax schedules, but holding land size constant at approximately 650 square metres (this is the median land size of land plots in the data set). The findings from this hypothetical exercise are reported in Table 9 below. By holding land size constant, we are able to illustrate how steeply liabilities increase as that land becomes more expensive. Columns 1 and 2 of Table 9 reports the land tax brackets and the marginal tax rate in each bracket. Land plots of between 625 and 675 square metres are then identified in each tax bracket and their average land values per square metre calculated (see column 3)[17]. The mean value per land plot in column 4 is then calculated by multiplying the mean land value per square metre by 650 square metres. Column 5 reports what the land tax liability in each tax bracket would be under the two schedules, and a final column 6 reports the average rate of land tax (calculated as the average land tax liability divided by the mean land value per land plot).

Under Version 1 of the proposed land tax schedules, the land tax liability rises from $0 to over $56 000 in the highest tax bracket, but the mean tax payment would be $18 639. The corresponding average land tax rate rises from 0 per cent to 1 per cent; over all land plots land tax is 0.74 per cent of mean land value. Now consider the non-linear version of the proposed land tax. Given the more progressive marginal rates under Version 2, it is unsurprising to find that it generates an even steeper increase in tax liabilities. The average rates of land tax are similar under both versions 1 and 2 for the four lowest tax brackets; however, in the highest tax bracket, the average land tax rate is noticeably higher under Version 2 at 1.4 times the highest land tax rate under Version 1.

[17] Due to small sample numbers, we are unable to isolate land plots that are exactly 650 square metres in size. Hence, we calculate the land value per square metres of land plots that range from 625 to 675 square metres as being representative of the values of 650 square metres land plots.

**Table 9: Hypothetical scenario: land tax liability of a 650 square metre land plot under the proposed land tax schedules**

| Land Tax Bracket | Marginal Tax Rate (%) | Mean Land Value ($ per $m^2$) | Mean Land Value ($ per plot) | Land Tax Liability ($) | Average Land Tax Rate (%) |
|---|---|---|---|---|---|
| **Proposed land tax schedule version 1** | | | | | |
| Less than $286.54 | 0.000% | $230 | $149,500 | $0 | 0.00% |
| $286.54 to less than $974.45 | 0.921% | $502 | $326,300 | $1,291 | 0.40% |
| $974.45 to less than $2000.22 | 1.011% | $1,235 | $802,750 | $5,833 | 0.73% |
| $2000.22 to less than $3025.30 | 1.101% | $2,354 | $1,530,100 | $13,397 | 0.88% |
| $3025.30 to less than $4145.28 | 1.191% | $3,460 | $2,249,000 | $21,570 | 0.96% |
| $4145.28 to less than $5697.08 | 1.281% | $4,739 | $3,080,350 | $31,822 | 1.03% |
| $5697.08 and over | 1.371% | $7,577 | $4,925,050 | $56,561 | 1.15% |
| **Proposed land tax schedule version 2** | | | | | |
| Less than $286.54 | 0.000% | $230 | $149,500 | $0 | 0.00% |
| $286.54 to less than $974.45 | 0.916% | $502 | $326,300 | $1,282 | 0.39% |
| $974.45 to less than $2000.22 | 1.006% | $1,235 | $802,750 | $5,797 | 0.72% |
| $2000.22 to less than $3025.30 | 1.124% | $2,354 | $1,530,100 | $13,382 | 0.87% |
| $3025.30 to less than $4145.28 | 1.214% | $3,460 | $2,249,000 | $21,715 | 0.97% |
| $4145.28 to less than $5697.08 | 1.304% | $4,739 | $3,080,350 | $32,152 | 1.04% |
| $5697.08 and over | 3.159% | $7,577 | $4,925,050 | $78,868 | 1.60% |

In the next section, we present statistical comparisons to analyse how the Review's proposed reform of land tax would redistribute the $1.5 billion tax burden currently generated by stamp duties. While we have estimated two sets of proposed land tax rates, we report estimates from the version where rates rise in a linear fashion. The spatial and distributional incidences are very similar under the two schedules, with the nonlinear schedule producing somewhat more exaggerated patterns of incidence[18].

[18] Results under Version 2 are available from the authors upon request.

# 5 HENRY REVIEW REFORMS SIMULATION MODELING AND SPATIAL ANALYSIS

## 5.1 Introduction

We estimate that the Victorian government raised $1.29 billion from stamp duty on transactions in housing and $261 million from land tax in 2006 in Melbourne[19]. Our analyses are based on a revenue neutral reform proposal, and so exactly the same $1.5 revenue is generated under the land tax reform examined below.

Table 10 compares the revenue generated in each tax bracket under the proposed and current land tax schedule, assuming the latter were applied uniformly on a broad base. Following the Henry Review recommendations, there is a zero rate bracket followed by six brackets over which the marginal tax rate rises from 0.921 per cent to 1.371 per cent of land value per square metre (see Chapter 4 for details). Under the proposals more than half of revenue is generated from the second lowest tax bracket and 84 per cent from the second and third lowest tax brackets. The revenue generated by each successively higher bracket quickly tails off. Only 1 per cent of total tax revenue is raised in the highest bracket despite high average land value per square metre; this is because there is a very small amount of land with such high values (approximately 17 hectares, or 0.02% of all assessable land).

Table 10 also reports the results of an exercise where we apply the *current* 2006 land tax rates and thresholds defined with respect to each plot's land value, and assuming that each plot is separately owned[20]. This schedule has a zero tax bracket followed by six brackets over which marginal rates rise from 0.8 per cent to 1.2 per cent per dollar of land value (see Chapter 3 for details). The schedule is applied as if the current 2006 land tax were a broad based tax that is levied on all land regardless of whether it is owner-occupied or investor-owned. The table shows that the current 2006 land tax regime would then generate a revenue amount of $1.14 billion; since this figure will be an underestimate (land tax is at present applied to the cumulative value of an owner's land holdings) it seems reasonable to suggest that (at least in Melbourne) the reform would generate no more revenue than if the current land tax were reformed along the lines of a broad-based tax. The distribution across brackets is such that a larger proportion of revenue is generated from the higher tax brackets under the current schedule. This is because larger land plots that have higher land values are typically found in the higher tax brackets of the current land tax regime. However, the second and third lowest tax brackets generate over 80 per cent of all revenue under both versions.

[19] According to the State government of Victoria (Statement of Finance 2006–07), all conveyance of property *state-wide* generated $2.47 billion in 2006. This figure, however, also includes stamp duty revenue generated from non-residential conveyances such as industrial and commercial transactions as well as all residential sales, including flats.

[20] The revenue estimates will then underestimate the amount of revenue generated because the current schedule is applied to the cumulative total of an owner's land holdings (see below for further discussion).

**Table 10: Aggregate revenue from proposed and current 2006 land tax schedules**

| Tax Bracket | Count | Proposed Land Tax Schedule | | Current 2006 Land Tax Schedule | |
|---|---|---|---|---|---|
| | | Sum $(millions) | % of Aggregate Revenue | Sum $(millions) | % of Aggregate Revenue |
| 1 | 305,166 | 0 | 0% | 0 | 0% |
| 2 | 593,904 | 776 | 51% | 702 | 62% |
| 3 | 104,152 | 504 | 33% | 219 | 19% |
| 4 | 19,197 | 127 | 8% | 72 | 6% |
| 5 | 6,907 | 55 | 4% | 51 | 4% |
| 6 | 3,075 | 29 | 2% | 50 | 4% |
| 7 | 790 | 16 | 1% | 43 | 4% |
| Total | 1,033,191 | 1,507,080 | 100% | 1,136 | 100% |

Note: The current land tax schedule is applied as if it were a broad based tax.

## 5.2 Formal incidence under the proposed land tax and stamp duty regimes

In the following statistical comparisons, we analyse how the Review's proposed reform of land tax would redistribute the tax burden currently generated by stamp duties (and paid by the purchasers of residential property). While we have estimated two sets of proposed land tax rates, we conduct our analysis using the version where rates rise in a linear fashion[21]. In Table 11, we begin our spatial analysis by listing land tax (under the proposed schedule) and stamp duty liabilities at progressively more distant 10 kilometre concentric rings around the CBD. Figure 6 portrays the same spatial analysis in the form of a map, but at more fine-grained 5 kilometre concentric rings near the city centre. A land tax based on square metre land values will radically change the spatial incidence of the revenue by concentrating the tax burden in the inner ring of business districts and suburbs. For example, almost half of the land tax revenue would be raised from land plots within 10 kilometres of the CBD, where land is most expensive (a mean value of $1335 per square metre). Less than one third of stamp duty revenue is levied from property transactions within the same 10 kilometre ring. On the other hand, the tax burden would be lower on the urban fringe where land is comparative cheaper at around $300 per square metre. For example, within the 30–40 and 40–50 kilometre bands, only 4 per cent of land tax revenue will be raised as compared to 15 per cent under stamp duties.

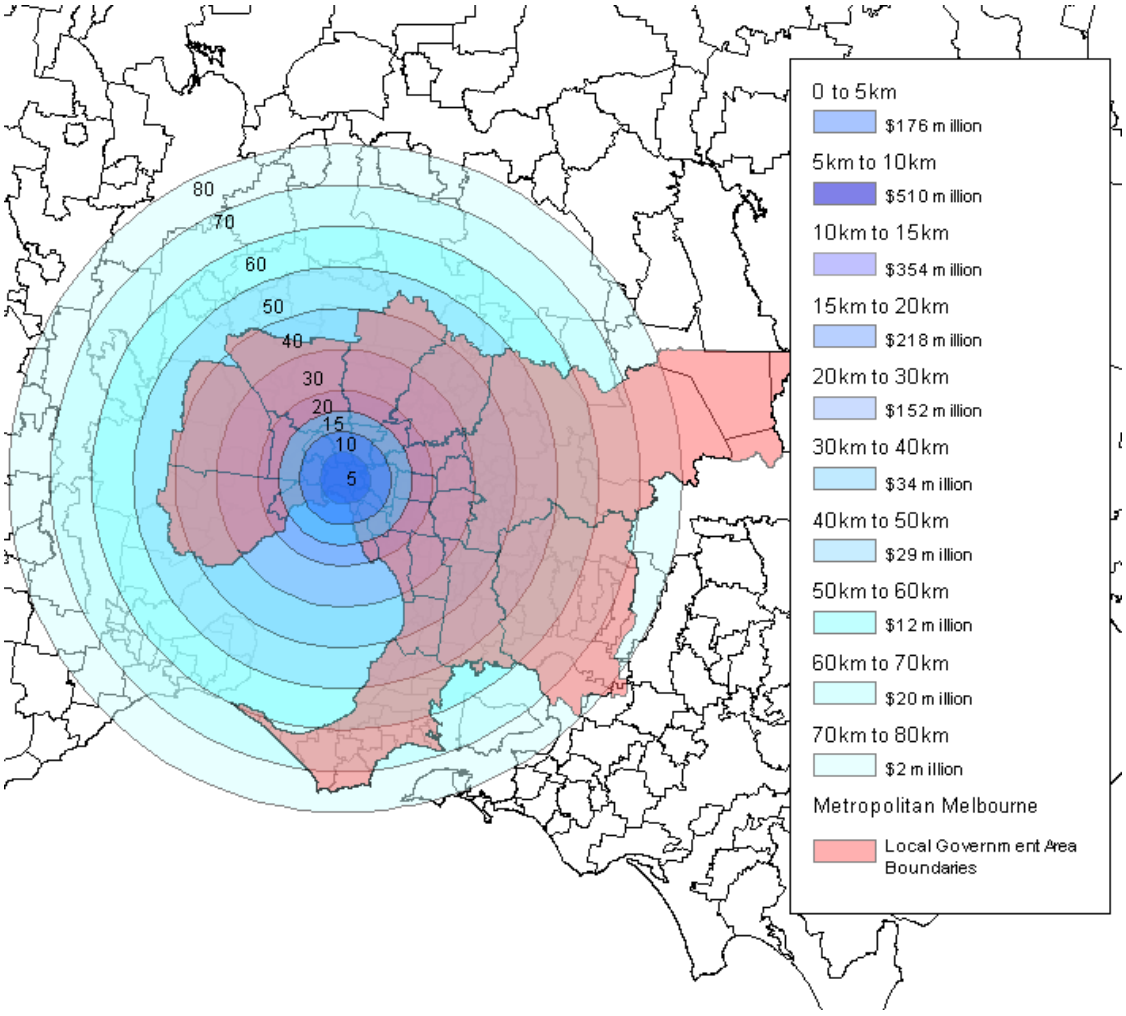
[21] Results based on the non-linear set of rates are available from the authors upon request. The spatial and distributional incidence are very similar under the two schedules, with the nonlinear schedule producing somewhat more exaggerated patterns of incidence.

**Table 11: Aggregate revenue from proposed land tax and stamp duty regimes by distance from CBD (10km)**

| Distance to CBD (10km intervals) | Proposed Land Tax | | | | Stamp Duty | | | |
|---|---|---|---|---|---|---|---|---|
| | Revenue | | Total Land Area $m^2$ (millions) | Mean Land Value $ per $m^2$ | Revenue | | Number of Transactions | Mean Property Price $'000s |
| | Sum $ (millions) | % of Aggregate revenue | | | Sum $ (millions) | % of Aggregate Revenue | | |
| 0km < 10km | 686 | 46% | 89 | 1,335 | 302 | 29% | 8,375 | 684 |
| 10km < 20km | 572 | 38% | 238 | 553 | 327 | 32% | 14,194 | 459 |
| 20km < 30km | 152 | 10% | 179 | 377 | 173 | 17% | 11,530 | 323 |
| 30km < 40km | 34 | 2% | 107 | 278 | 87 | 8% | 7,217 | 272 |
| 40km < 50km | 29 | 2% | 65 | 309 | 73 | 7% | 4,926 | 318 |
| 50km < 60km | 12 | 1% | 27 | 295 | 26 | 3% | 1,811 | 312 |
| 60km < 70km | 20 | 1% | 36 | 310 | 35 | 3% | 2,141 | 342 |
| 70km < | 2 | 0.2% | 3 | 318 | 2 | 0.2% | 128 | 356 |
| Total | 1,507 | 100% | 744 | 576 | 1,025[a] | 100% | 50,322 | 414 |

Note: The aggregate amount of revenue generated by stamp duty ($1.025 billion) is less than the amount generated by the proposed land tax schedule because approximately 25 per cent of stamp duty transactions in the VG data could not be matched to their property characteristics in the Valuation data. For details on the data matching process and implications of the loss of this 25 per cent of cases on the analysis, refer to the Method section.

**Figure 6: Aggregate revenue from proposed land tax by distance from CBD (5km)**




The geographical redistribution of the tax burden will also differentially affect municipal governments. First we ask whether the redistribution spatially concentrates the tax burden into a few local government areas. The five municipalities that generate the largest amounts of stamp duty are also the five municipalities that would be responsible for most land tax revenue[22]. Under the proposed land tax, five municipalities generate approximately 42 per cent of total revenue, which is 1.5 times the proportion of revenue (28%) generated by stamp duties. Inequality in the geographical distribution of tax liabilities (across municipalities) can be measured by the Gini coefficient , with values closer to one indicating greater inequality and values closer to zero indicating distributions that are more equal (see Figure 11)[23]. Under the proposed land tax schedule, the distribution is significantly more unequal as reflected

[22] This a familiar measure of inequality known as the concentration ratio. Concentration ratios are commonly used in industrial economics to measure the market share owned by, say, four or five of the largest firms in an industry.

[23] The Gini coefficient is commonly used to measure inequality of wealth or income. To derive the Gini coefficient under the proposed land tax regime (see Figure 7(a), Melbourne municipalities are ranked from the municipality generating the lowest to the highest amount of land tax revenue from left to right along the horizontal axis. The vertical axis measures the proportion of total land tax revenue that is cumulatively generated by the municipalities. So at 100 per cent, the total land tax revenue is equal to $1.29 billion. On calculating the ratio of the area in blue to the area under the $45^{o}$ line we derive the Gini coefficient. The same steps are applied to derive the Gini coefficient under the stamp duty regime (see Figure 7(b) although in this case the municipalities are ranked from lowest to highest in terms of the amount of stamp duty revenue generated.

in a Gini coefficient of 0.485, which is 1.8 times the Gini coefficient under the stamp duty regime (0.263).

**Figure 7: Gini coefficient under the proposed land tax schedule**

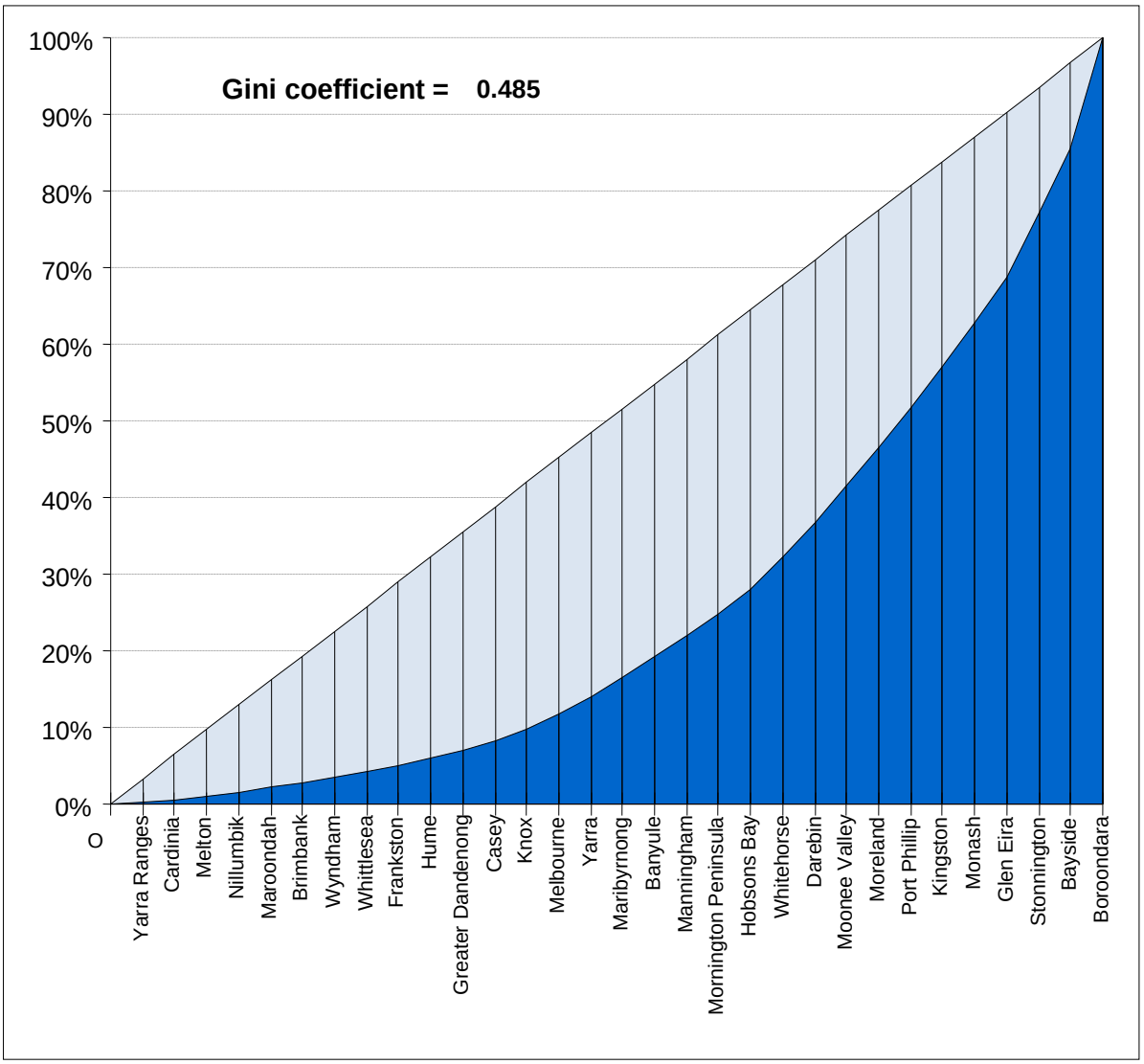
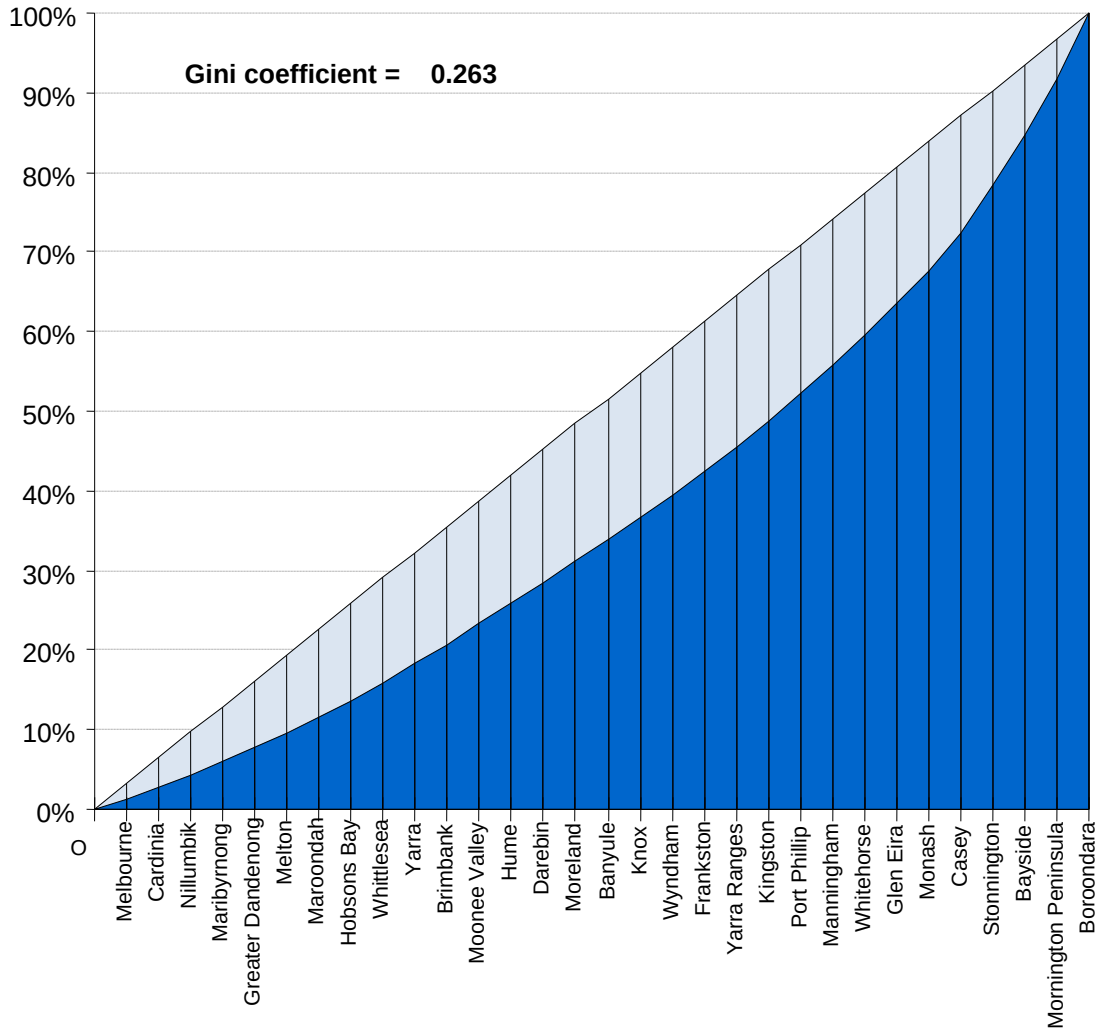


**Figure 8: Gini coefficient under the current stamp duty schedule**

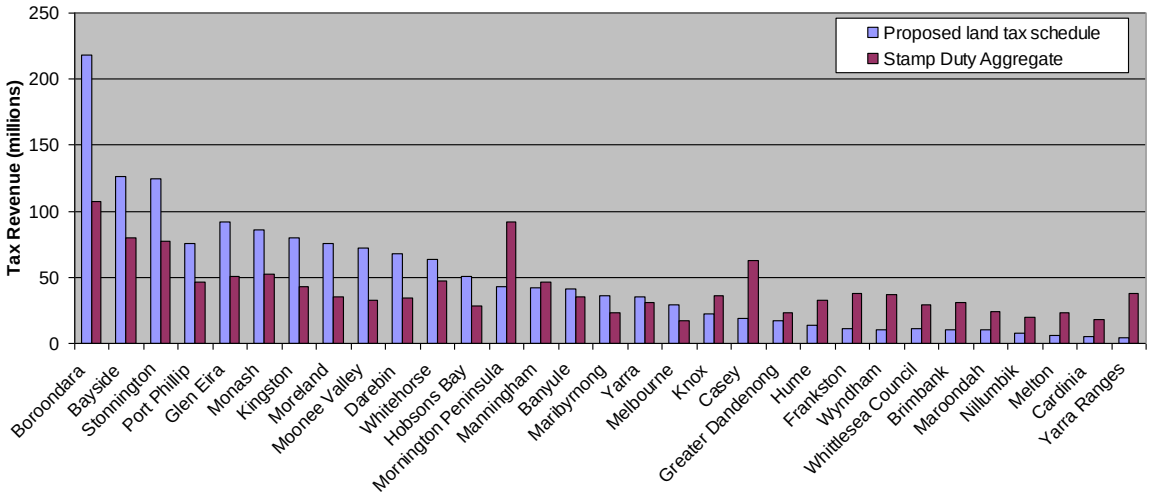



In Figure 9 we identify the municipalities responsible for the increased concentration and inequality of tax revenue under the broad based land tax. Melbourne municipal government areas are ranked from highest to lowest according to the land tax revenue generated from residential land plots within their boundaries. For example, the Boroondara municipality (which covers suburbs such as Kew, Hawthorn, Balwyn and Camberwell) would be responsible for over $218 million of land tax, the highest among the 31 municipalities. Approximately one-third of all revenue would be generated by just three municipalities—Boroondara, Bayside and Stonnington. This is primarily because of expensive average land values of approximately $1100 per square metre in Boroondara and Bayside, and $1800 per square metre in Stonnington. There are some municipalities with even more expensive land e.g. Melbourne and Port Philip, but their assessable residential land areas are smaller (see appendix Table A3). Stamp duty payments in each municipality are also presented in Figure 9. Stamp duty revenue appears to be more evenly spread across municipalities. It is noteworthy that the proposed reforms will shift the tax incidence onto suburbs with high taxable income per taxpayers, in particular Stonnington, Bayside and Boroondara.

Figure 9 also serves to visually highlight the municipalities that would attract a gain or experience a loss in tax revenue under the proposed reforms. Gains in revenue are

clearly observable in municipalities with expensive land. For example, tax revenue generated from Boroondara would double from approximately $100 million to over $218 million if reforms are introduced. On the other hand, in Yarra Range, where land is noticeably cheaper than in other municipalities, tax revenue drops by 90 per cent.

**Figure 9: Aggregate revenue from proposed land tax and stamp duty regimes, by Melbourne municipalities**




An important question is whether this increasingly unequal geographical distribution of the tax burden is more equitable because it requires better off communities to shoulder more of the tax burden than under stamp duties. Using socio-economic and demographic measures obtained from census data by municipality, that is local government area (LGA), we can analyse the formal incidence of land tax and stamp duties across communities that differ in terms of age, income, occupation, housing tenure and education. These are all typical 'markers' of the economic wellbeing and socio-demographic profile of a community's residents (see for example the Socio-economic Indexes for Areas or SEIFA).

Figure 10 ranks municipalities from highest to lowest in terms of taxable income per taxpayer[24]. Per capita land taxes are much higher in LGAs where income per capita is correspondingly high. The relationship is a strong one with a correlation coefficient (between per capita land tax and per capita income) exceeding 0.8. The better off communities will then pay more and so a broad based land tax will redistribute the tax burden in an equitable way.

Figures 11 and 12 examine socioeconomic indicators and their relationship to land tax per capita; they show that LGAs such as Port Philip, Stonnington, Yarra and Melbourne, that typically feature suburbs with more expensive land per square metre, contain the highest proportion of highly qualified residents in professional occupations. The relationship is a strong one with correlation coefficients of around 0.7.

Next, in Figures 13 to 14, we investigate patterns with respect to housing tenure and the age distribution of residents. It turns out that that relationships here are considerably weaker; because the private rental housing stock is concentrated in the inner to middle ring of suburbs, LGAs with relatively high (low) shares of rental housing (owner occupied housing) have higher per capita land tax burdens. On the

[24] Income estimates are taken from BITRE's (2007) estimates of 2004-05 taxable income per taxpayer, inflated to 2006 prices using the Consumer Price Index. Taxpayers are Federal income taxpayers. Land tax per taxpayer by LGA are derived aggregate land tax from each LGA divided the number of Federal income taxpayers in each LGA.

other hand, since the over-65 segment of the population typically live in the middle ring of suburbs, LGAs with a higher share of over-65s typically have larger land tax burdens. But again these relationships are more tenuous than those based on income and socioeconomic indicators.

**Figure 10: Municipalities ranked from highest to lowest in terms of taxable income per taxpayer**

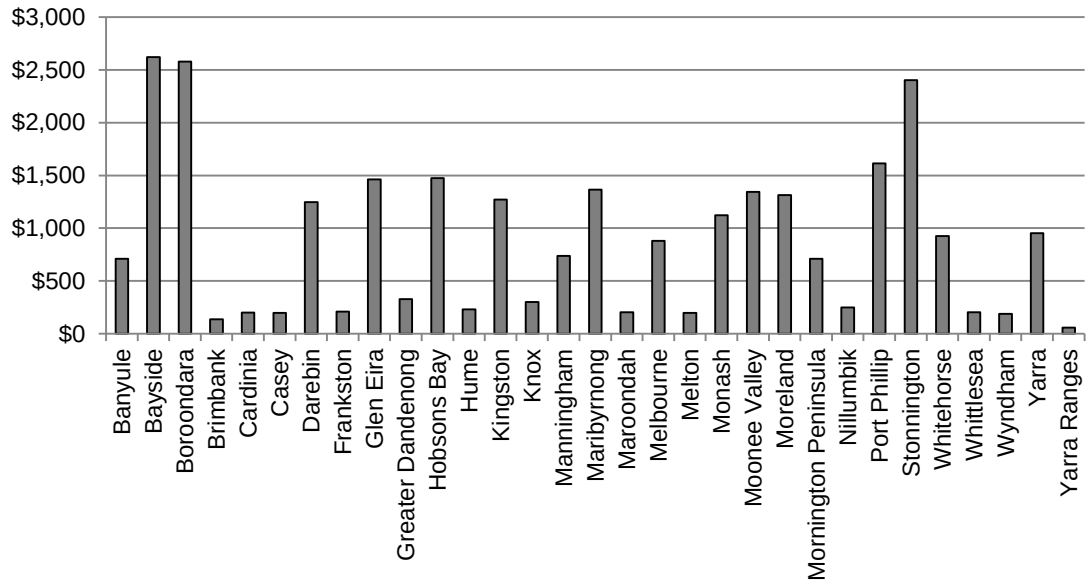



**Figure 11: Municipalities ranked from highest to lowest in terms of proportion of residents who are managers or professionals**

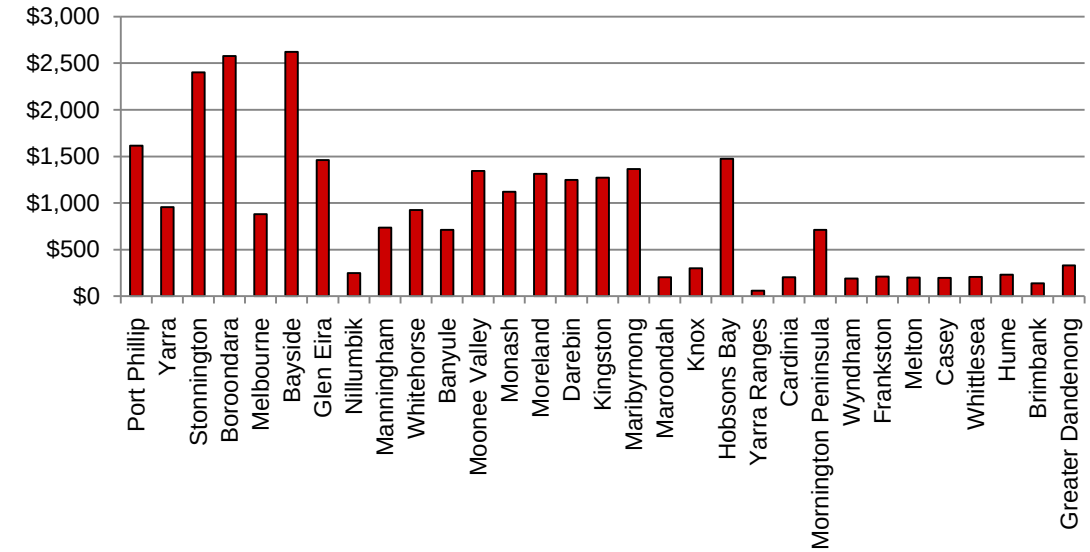


**Figure 12: Municipalities ranked from highest to lowest in terms of proportion of residents with a bachelor degree or higher**

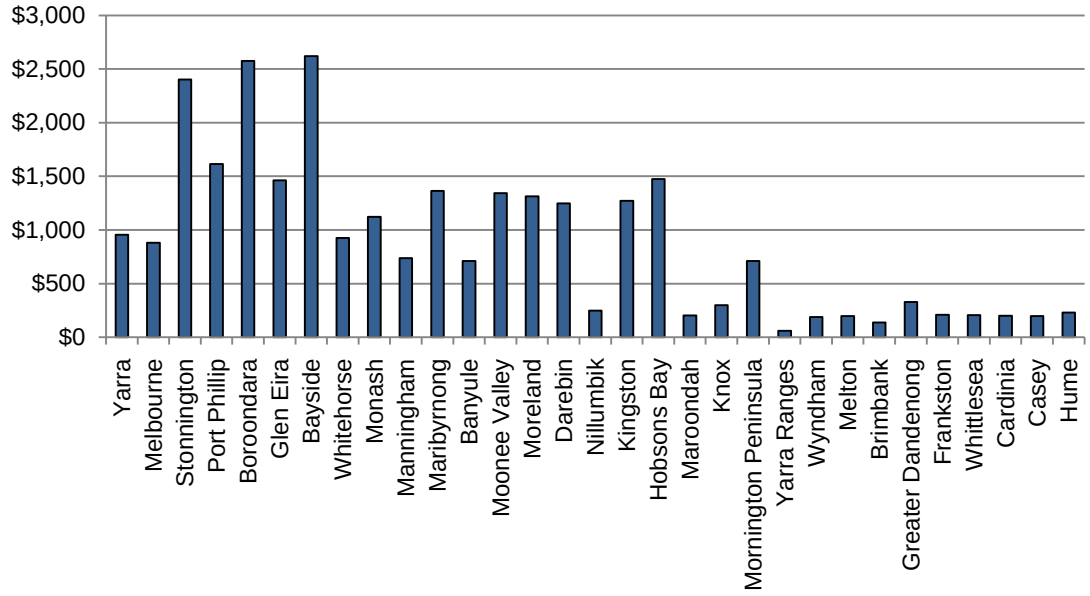



**Figure 13: Municipalities ranked from highest to lowest in terms of proportion of owner occupied dwellings**

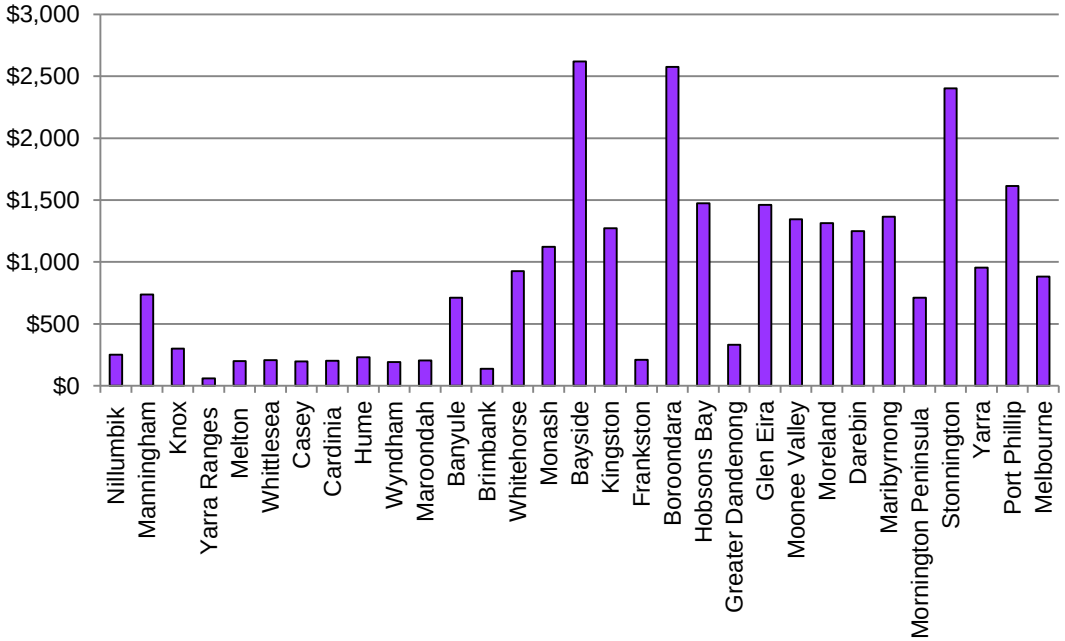


**Figure 14: Municipalities ranked from highest to lowest in terms of proportion of investment dwellings**

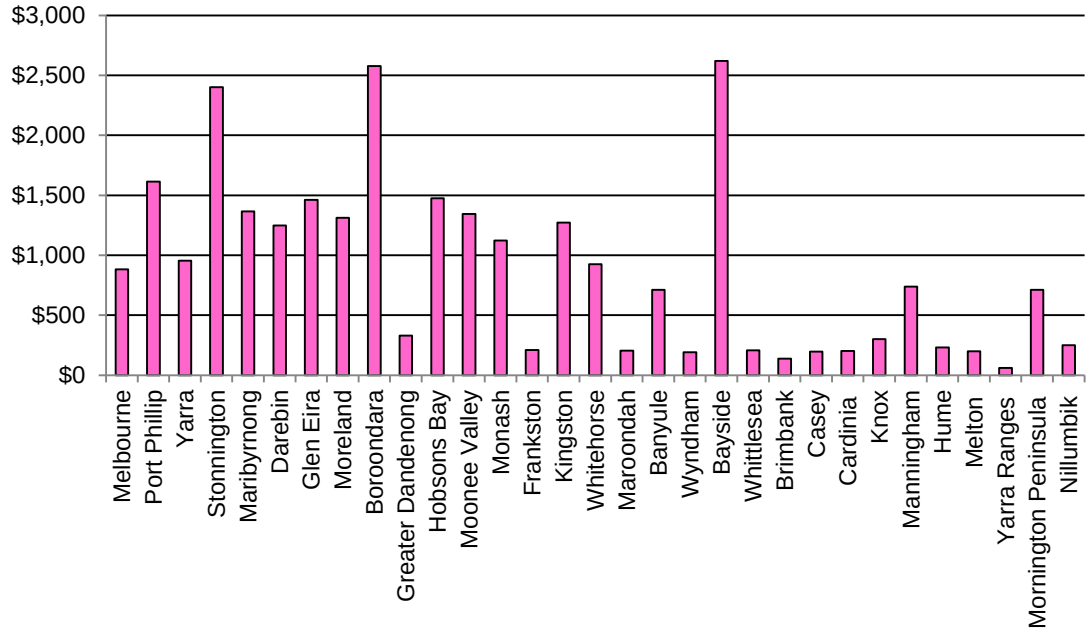
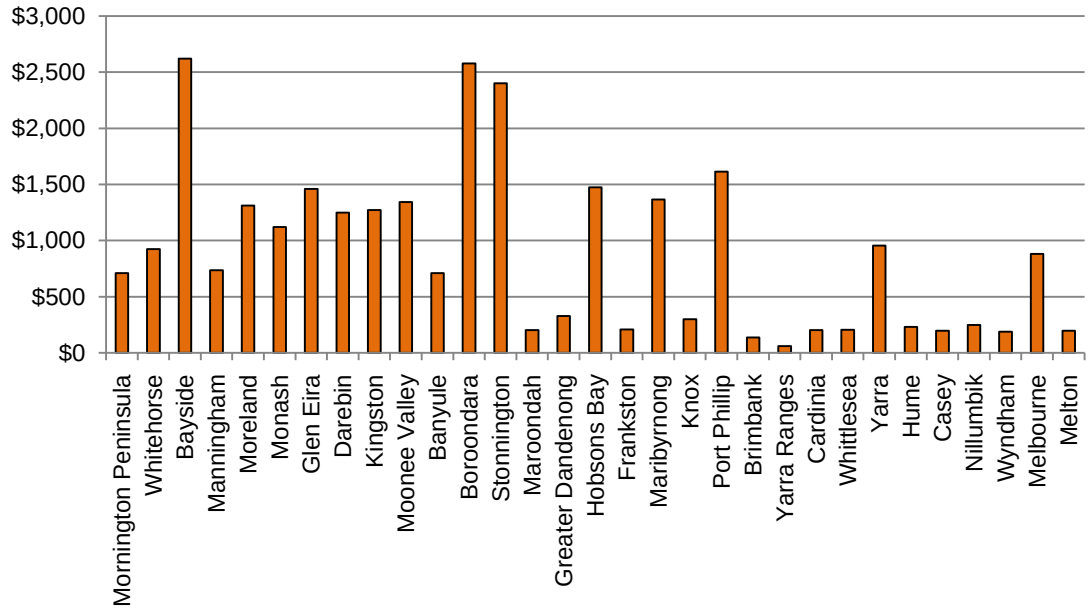



**Figure 15: Municipalities ranked from highest to lowest in terms of proportion of residents aged 65 years or over**




Source: Income estimates are taken from BITRE's (2007) estimates of 2004–05 taxable income per taxpayer, inflated to 2006 prices using the Consumer Price Index. Taxpayers are Federal income taxpayers. Land tax per taxpayer by LGA are derived aggregate land tax from each LGA divided the number of Federal income taxpayers in each LGA.

** Correlation coefficient significant at the 1 per cent level; * Correlation coefficient significant at the 5 per cent level.

Table 12 reports the results of a value segment analysis that measures shifts in the tax burden from less expensive to more expensive land. Land plots are ranked from the lowest to highest value on the basis of land value per square metre, and then

placed into deciles. Thus the lowest decile (number 1) includes the cheapest 10 per cent of all land plots while the highest (number 10) includes the most expensive 10 per cent of all land plots. Land is twelve times more expensive in the highest decile as it is in the lowest decile (see column 4). No tax is paid by owners of land in the bottom two deciles as they fall into the zero rate tax bracket. On the other hand, taxpayers owning the most expensive 10 per cent of land plots meet 40 per cent of total land tax payments. Together, the two highest deciles account for almost two-thirds of all land tax payments. We can expect the proposed reform to result in accelerated development, and given the spatial pattern of land tax liabilities, this should be particularly apparent with respect to Brownfield sites nearer to the CBD where land values per square metre are particularly high. Where stamp duty can deter potential transfers of property from lower value uses to higher value uses, its removal might well accelerate such transfers and improve allocative efficiency.

Table 12 also ranks properties bought and sold in 2006 from lowest to highest in terms of their *land value per square metre*. The last column shows that there is strong correlation between land value and property price. Despite the different tax base stamp duty payments also rise as land plots become more expensive, but they are more evenly distributed across land value deciles. In the highest decile land plots account for 40 per cent of total land tax revenue, but transactions in residential property with unimproved land values in this decile generate only one-third of stamp duty revenue. The cheapest 30 per cent of transactions according to unimproved land values account for almost 10 per cent of total stamp duty revenue, but close to zero land tax revenue.

**Table 12: Aggregate revenue from proposed land tax and stamp duty regimes, by land value (deciles)**

| Land Value Deciles | Proposed Land Tax Schedule | | | Stamp Duty | | |
|---|---|---|---|---|---|---|
| | Revenue | | Mean Land Value $ per $m^2$ | Revenue | | Mean Property Price $'000s |
| | Sum $(millions) | % of Aggregate Revenue | | Sum $(millions) | % of Aggregate Revenue | |
| 1 | 0 | 0% | 154 | 19 | 1% | 114 |
| 2 | 0 | 0% | 226 | 39 | 3% | 167 |
| 3 | 0[a] | 0%[a] | 268 | 60 | 5% | 218 |
| 4 | 16 | 1% | 310 | 79 | 6% | 254 |
| 5 | 48 | 3% | 361 | 84 | 7% | 288 |
| 6 | 94 | 6% | 433 | 105 | 8% | 328 |
| 7 | 155 | 10% | 530 | 124 | 10% | 379 |
| 8 | 231 | 15% | 665 | 153 | 12% | 447 |
| 9 | 357 | 24% | 912 | 206 | 16% | 574 |
| 10 | 606 | 40% | 1,898 | 420 | 33% | 1,124 |
| Total | 1,507 | 100% | 576 | 1,290 | 100% | 389 |

Note: a. The aggregate revenue in the third tax bracket is actually $31 000, amounting to 0.002 per cent of aggregate revenue.

The valuation database can be used to explore the relationship between land tax liabilities (stamp duty liabilities) and land area. Larger land areas will include parcels that are yet to be subdivided, and typically located on the urban fringe, while small land areas generally have properties occupying them, and are located nearer the CBD. Table 13 ranks all land plots from the smallest to the largest, and then places

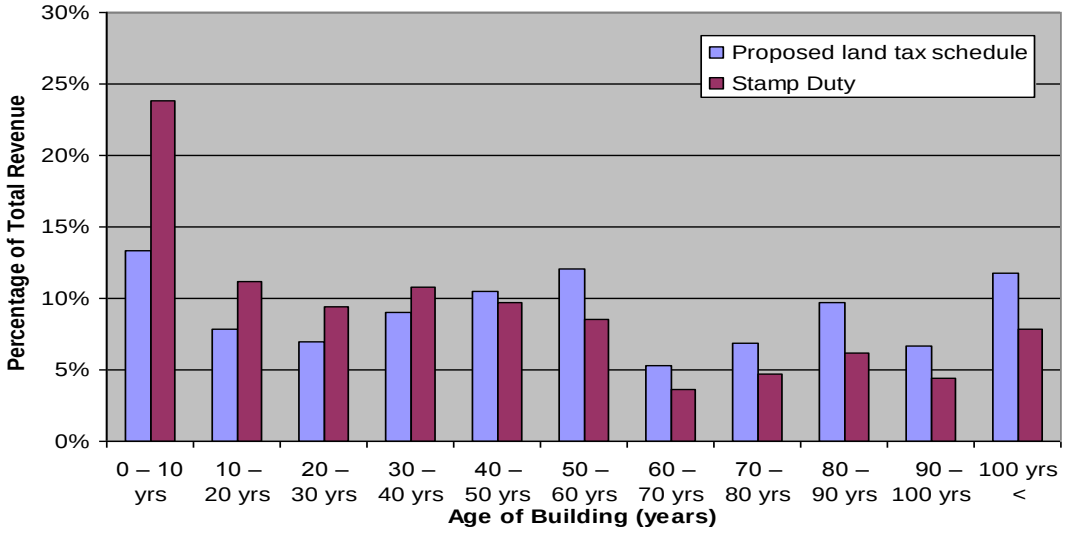
them into quintiles according to land size. Columns 2 and 3 show that small land plots account for a disproportionately high tax burden. Despite a relatively low assessable land area, the lowest quintile by size accounts for around one-third of total revenue. This is because (see column 4) small plots are typically very expensive. Table 13 also ranks properties transacted in 2006 from smallest to largest in terms of land area. We find a different pattern for stamp duty. Property transactions involving larger land plots account for a disproportionately high amount of stamp duty; 25 per cent of stamp duty revenue is generated from property transactions involving land plots in the highest quintile. These different patterns are the product of differential land values per square metre that are strongly related to size of land plot.

**Table 13: Aggregate revenue from proposed land tax and stamp duty regimes, by land area (quintiles)**

| **Proposed land tax schedule** | | | | **Stamp duty** | | | |
|---|---|---|---|---|---|---|---|
| **Land area $m^2$** | **Revenue** | | **Mean land tax liability $ per $m^2$** | **Land area $m^2$** | **Revenue** | | **Mean stamp duty liability $ per $m^2$** |
| | **Sum $ (millions)** | **% of Aggregate revenue** | | | **Sum $ (millions)** | **% of Aggregate revenue** | |
| 124 < 533 | 478 | 32% | 6.9 | 0 < 470 | 229 | 22% | 134 |
| 534 < 608 | 234 | 16% | 1.7 | 471 < 591 | 156 | 15% | 28 |
| 609 < 688 | 266 | 18% | 1.7 | 592 < 668 | 176 | 17% | 28 |
| 689 < 821 | 285 | 19% | 1.6 | 669 < 807 | 205 | 20% | 28 |
| 822 < | 244 | 16% | 1.0 | 808 < | 259 | 25% | 22 |
| Total | 1,507 | 100% | 2.6 | Total | 1,025 | 100% | 47 |

Figure 16 contains an analysis of tax revenue by the vintage of Melbourne's housing stock. It can be seen that the largest proportion of stamp duty revenue is generated from newly constructed stock. Properties built during the last ten years account for one-quarter of stamp duty revenue from property transactions in 2006; this is more than double the stamp duty revenue generated from stock built in any other ten-year vintage. This is despite the fact that the average property price of stock constructed more than 60 years old is higher than that of newly constructed buildings. There is no clear discernible pattern in the distribution of land tax revenue by age of building. Vintage stock are clearly sitting on far more expensive land than newly constructed buildings; but this is offset by the relatively small land area that old buildings sit on.

**Figure 16: Percentage of total revenue from proposed land tax and stamp duty regimes by age of building[a]**




Note: a. Refer to appendix Table A7 for supporting table.

Finally, we conclude tax burden comparisons by investigating whether there are any differences in revenue patterns by type of overlay. Overlays identify neighbourhoods with land and buildings that have idiosyncratic characteristics, for example, environmentally significant landscapes, clusters of historical buildings or hazards (e.g. bushfire). Areas and properties subject to overlays must comply with additional restrictions on the use of land and/or the design of buildings; for example, a permit is required to remove vegetation in environmentally significant areas. The key finding is that a broad based land tax, as envisaged in this report, shifts the tax burden in ways that will significantly increase the burden on heritage land (see Table 14). This is due to the disproportionate zoning of heritage land in the inner and middle ring of suburbs, where the built environment belongs to an older vintage (see also Table A7 in appendix) and land values are higher.

**Table 14: Aggregate revenue from proposed land tax and stamp duty regimes by overlay type**

| | **Proposed land tax schedule** | | | **Stamp duty** | | |
|---|---|---|---|---|---|---|
| **Overlay type** | **Revenue** | | **Mean land value** | **Revenue** | | **Mean property price** |
| | **Sum $ (millions)** | **% of Aggregate revenue** | **$ per m$^2$ (hundreds)** | **Sum $ (millions)** | **% of Aggregate revenue** | **$'000s** |
| **Environmental significance** | 17 | 1% | 480 | 16 | 1% | 503 |
| **Heritage** | 286 | 19% | 1,766 | 119 | 9% | 766 |
| **Land subject to inundation** | 4 | 0.3% | 543 | 4 | 0.3% | 429 |
| **Wildfire management** | 1 | 0.1% | 168 | 14 | 1% | 347 |
| **No overlay** | 1199 | 80% | 511 | 872 | 88% | 371 |
| **Total** | 1,507 | 100% | 576 | 1,025 | 100% | 389 |

An important source of the shifts in tax burden that we identify in this section arises because we replace a duty that applies a tax rate to the value of land and buildings constructed on a land plot, to one that applies a tax rate to the square metre value of land contained in a land plot, and then computes the tax liability as the product of this computed dollar value and land area. Appendix A5 investigates this further.

## 5.3 Impacts of the proposed land tax on land values

The theoretical framework outlined in Chapter 2 suggests that a broad based land tax avoids distortionary effects associated with the current non-neutral land tax arrangement because the former is uniformly applied on all land regardless of type of ownership (refer to Figure 3 for details). The tax burden imposed by a neutral land tax is shifted to landowners who receive lower after-tax rents that are capitalised into lower land prices as the value of land will fall by the discounted present value of the future stream of tax liabilities. This is a favourable outcome for housing consumers seeking to rent or purchase property as a decline in the price of land will promote the supply of affordable land and therefore housing (Henry et al. 2009, pp.248–50).

Table 15 shows that the expected decline in land value as a result of the proposed land tax will be greatest in those suburbs in and around the CBD, where land is currently most expensive. The 12 per cent reduction in average land values will make housing closest to the CBD, where jobs are still concentrated (see Tsutsumi 2006), more affordable for those seeking to locate closer to employment opportunities in the city. However, in suburbs further away from the CBD, the percentage decline in mean land value will be noticeably lower at 8 per cent or less.

**Table 15: Reduction in mean land values due to the proposed land tax, by distance from CBD (10km ring)**

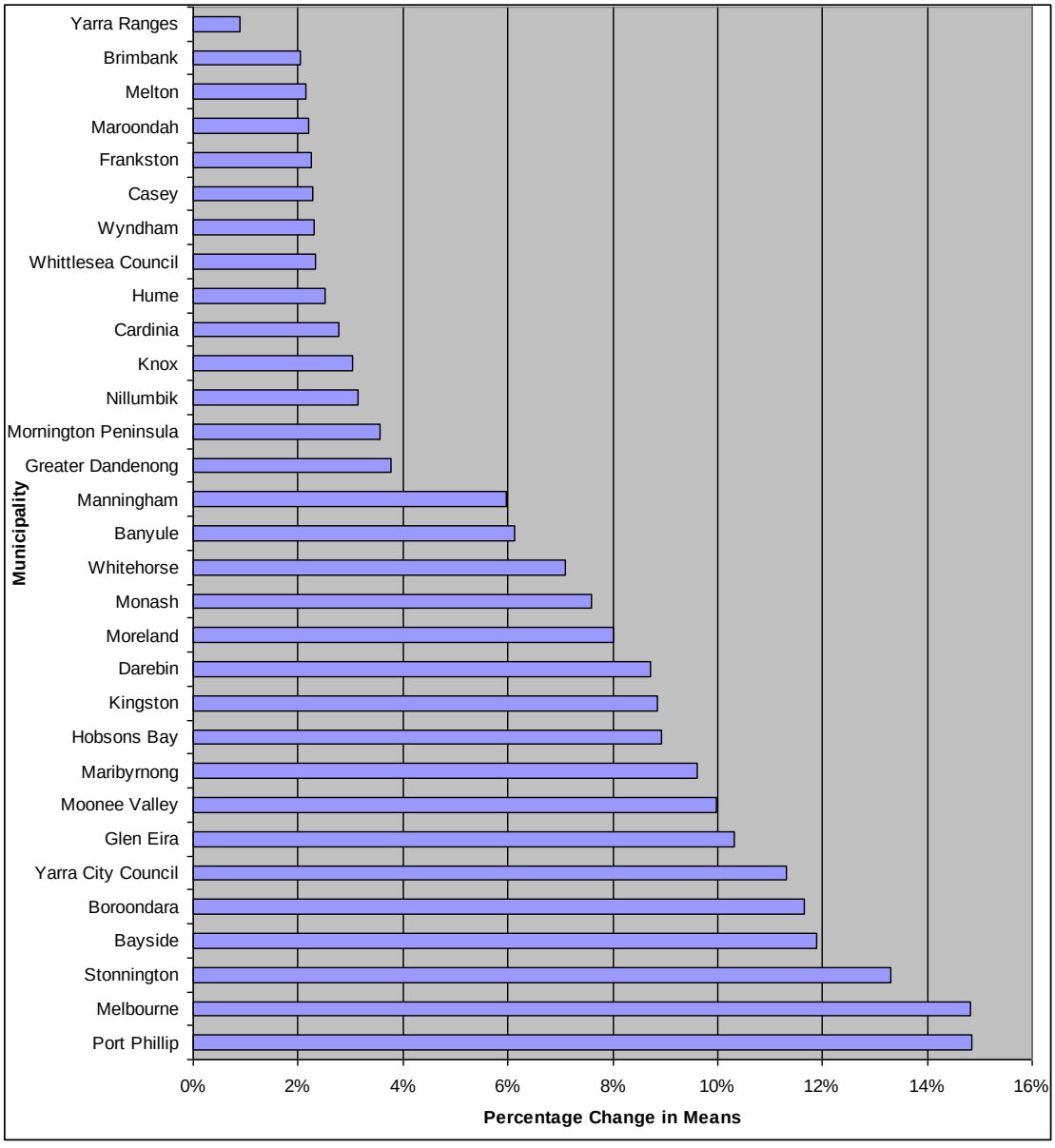
| Distance from CBD (10km ring) | Mean Assessed Land Value $ | Mean Reduction in Land Value due to Capitalisation $ | % Decrease in Mean Land Value after Capitalisation |
|---|---|---|---|
| 0km < 10km | 551,099 | 65,657.80 | 12% |
| 10km < 20km | 365,163 | 27,411.82 | 8% |
| 20km < 30km | 257,852 | 10,561.33 | 4% |
| 30km < 40km | 196,434 | 4,322.37 | 2% |
| 40km < 50km | 245,891 | 6,686.88 | 3% |
| 50km < 60km | 238,185 | 6,977.59 | 3% |
| 60km < 70km | 271,739 | 8,940.75 | 3% |
| ≥ 70km | 319,904 | 14,681.14 | 5% |
| Total | 334,877 | 24,311.09 | 5% |

We can draw the same conclusions from a spatial analysis based on municipalities, as illustrated in Figure 17. In Melbourne and Port Philip, where average land values are $2600 and $2800 per square metre respectively, the mean land value could decline by as much as 15 per cent as a result of capitalisation. In Port Philip, for example, the mean land value of $693 000 is predicted to fall by $103 000. Similar observations can be made for the next most expensive three municipalities—Stonnington, Bayside and Boroondara, where the decline in land value will typically be 11 per cent or more. Note, however, that these municipalities represent the upper end of the property market where average property prices are approximately $800 000 in Melbourne and Port Philip (*2006 values*), and approach $1 million (*2006 values*) on average in Stonnington, Bayside and Boroondara (see Table A3 rightmost column). Capitalisation effects will then depress the property prices of established home

owners, and particularly so in the inner ring of suburbs. The reductions in land values and property prices will give first home buyers accessibility a boost, and again this will be most pronounced in the inner ring of suburbs. It will also mean that future investors can acquire rental properties at a lower capital outlay than would otherwise be the case under present arrangements. Capitalisation impacts will then help offset land tax liabilities and will lower rents if passed on in a competitive rental market[25].

The results of the municipality analysis are corroborated by a land value segment analysis which shows that in the lowest land value quintile, there is hardly any reduction in land values, while purchasers in the highest land value decile enjoy a 12 per cent reduction in land prices[26].

**Figure 17: Reduction in mean land values due to the proposed land tax by municipality**




[25] There is a considerable literature that has documented the capitalisation of property taxes into land values (see references in Wood 2001; Wood & Tu 2004).

[26] Results by land value segment are available from the authors upon request.

# 6 SUMMARY AND FUTURE RESEARCH DIRECTIONS

## 6.1 Summary

There are two main recommendations from the Henry Review on tax reform that have a *direct* bearing on the private rental housing system:

1. A savings income discount (SID) of 40 per cent will apply to the net rental income (including capital gains) from most non-business assets other than shares. We have dealt with this reform proposal in our first final report (see Wood et al. 2011).
2. The present array of stamp duties on conveyance is to be abolished and replaced by a broad based land tax that is levied according to a progressive rate structure applied to land values per square metre. An analysis of the impacts of this recommendation is the focus of the present report.

Stamp duty fails to achieve any obvious redistribution goal, impedes the efficient allocation of resources between competing uses and has adverse impacts on home buyer borrowing constraints while also increasing the price of housing. Furthermore, under present land tax arrangements, tax incidence is distortionary because land used for owner occupied housing is tax exempt, while land used for private rental housing is subject to the land tax. In a housing market where land can be used for rental or owner occupied housing, the taxation of the former results in a contraction in the supply of rental housing, as some rental investors seek higher returns elsewhere, and an increase in rents. Thus the current land tax arrangements reduce the supply of affordable rental housing, an impact that is further aggravated by its application to the cumulative unimproved value of land that hampers the attraction of private finance (from superannuation funds, for instance) into the private rental housing market. The Henry Review recommends a broad based land tax to avoid the distortionary effects that result from the current non-tenure neutral land tax arrangements. Furthermore, the recommendation that land tax thresholds be determined according to per square metre value aims to tax more expensive land at higher rates.

We model a revenue neutral land tax schedule according to the Review recommendations. Our findings suggest that under the proposed arrangements, the formal incidence of the tax will be felt most keenly where pressure on land use is most acute. This is in part due to progressive marginal rates of land tax; land with higher per square metre values attract a higher marginal rate of land.

The proposed land tax will also concentrate the tax incidence on municipalities that contain relatively well-off communities, as shown by a strong correlation between land tax burdens and income, occupation and education indicators. Our land value segment analysis confirms findings from the spatial and municipality analysis; suburbs that are located closer to the CBD, and relatively affluent, have the most expensive land and will therefore bear the highest tax burdens under the reforms.

A flat rate of land tax that is uniformly applied to the market values of land will not affect city boundaries and the density of urban areas (see Section 2.3). But the Henry Review recommends a progressive rate structure and this will impact on spatial location decisions. A landowner holding a plot of expensive (high per square metre value) land close to the CBD can sell up and on reinvesting all the proceeds in a cheaper (low per square metre value) land parcel on the fringe achieve a lower land tax burden. With a flat rate schedule there is no tax advantage to be gained from such relocation. We can then expect a changing spatial pattern of demand for housing as some households move away from expensive inner suburbs.

In principle a flat rate of land tax will not affect the timing of development; a vacant brownfield site, for example, will have the same optimal timing of development provided land values are assessed on the basis of 'highest and best' use, and land owners are not subject to binding borrowing constraints (they can meet land tax by borrowing if necessary). In practice we can expect the proposed reform to speed development with respect to brownfield sites if (as seems likely) developers find access to finance problematic in the post global financial crisis era (Bryant 2012 forthcoming). The removal of stamp duty might also affect the timing of development as their abolition will speed transfers of property from lower value uses to higher value uses. There could also be efficiency gains as 'empty nesters' now find trading down is a more effective method of releasing housing equity, with the result that housing stocks are more fully utilised.

Economic theory predicts that a broad based land tax is shifted to landowners who receive lower after-tax rents that are in turn capitalised into lower land values. We find that the average plot with a land value of $335 000 (at 2006 prices) will decline by $24 000, or approximately 5 per cent. However, the expected decline in land value will be greatest in those suburbs in and around the CBD (at around 12%), where land is currently most expensive. However, in suburbs further away from the CBD, the percentage decline in mean land value will be lower at 8 per cent or less. These estimates are conservative because they do not include estimates of the fall in land and house values that will eventuate due to the elimination of stamp duties. Their inclusion will mean that owner occupied housing is more affordable under the proposed reforms, since the aggregate fall in house prices will exceed the capitalised value of land tax payments. There will also be a boost to the supply (and affordability) of rental housing as the broad based land tax puts landlords and home owners on an equal footing.

We can expect criticism when advocating tax reforms because irreversible decisions have been made on the basis of current tax arrangements. If these arrangements are subsequently changed they have arbitrary effects. For example, when buying a home, purchasers pay stamp duty under current arrangements. If we now abolish stamp duties and replace them by land taxes, previous home buyers will feel aggrieved on the grounds that they are being asked to pay an additional tax. In other words, why should a home owner begin paying land tax when they have already paid stamp duty on the same property? Transitional arrangements can be designed to address this undesirable outcome. For example, if the broad based land tax is introduced when a landowner next makes a purchase, they will only begin paying the land tax on a property which they have not had to pay stamp duty on. These transitional arrangements put first home buyers and existing home owners on a more equal footing since both gain the benefit from abolition of stamp duty.

## 6.2 Future research

There are some important caveats to our findings. We have omitted flats and apartments from our stamp duty and land tax calculations due to the absence of land area information on these dwellings. Furthermore, the analysis has been conducted using 2006 stamp duty schedule and property transactions. The availability of more recent data would provide an opportunity to update the findings using a more recent stamp duty schedule and transaction year. It would also be helpful if the analysis were extended to include commercial, agricultural and industrial land. This would be straightforward using the available data bases.

The analysis would be enriched if replicated on similar property data, but for another capital city. Such comparative analysis across cities would provide insights into the

extent to which impacts of the proposed reforms differ across cities with different housing markets and urban forms. We have been unable to measure the impact of the suggested reforms in non-state capital areas of Victoria. The regions face their own particular issues regarding land use, and so extension of the empirical analysis to the regions would be a worthy extension of the research.

The capitalisation analysis assumes that 100 per cent of the land tax will be capitalised into land prices. Further research is warranted on the extent to which the capitalisation actually occurs. As the theory in Chapter 2 demonstrates, the complete capitalisation prediction rests on assumptions about the behaviour of land owners, and in particular those holding rural land. Stamp duty is shifted forward into house prices but the degree of forward shifting will depend upon the price elasticity of supply. There are numerous studies in the United States and United Kingdom that have used property transaction data to explore incidence and capitalisation issues; a typical approach is the design of natural experiment studies where variation in tax arrangements are exploited for measurement purposes (see Leigh 2011 for an Australian example).

This report explores the recommendations of the Henry Review with respect to land tax and stamp duty. These recommendations included an increasing marginal rate schedule (see recommendation 52 in Henry et al. 2009). The theoretical analysis in Chapter 2 is conducted assuming a flat rate of land tax and much of the academic literature examines incidence issues assuming a flat rate. A potentially important extension of the analysis is to calculate what the relevant flat tax rate would be, and how the capitalisation effects of changes in the tax rate might impact different land owners.

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# APPENDIX

**Table A1: List of explanatory variables in the land value model for imputation of missing land values**

| Variable name | Definition | Measurement |
|---|---|---|
| Y | Dependent variable, log of the per hectare sales price of vacant land parcel | Nominal Dollars |
| C | Vector of continuous and dummy variables capturing structural and locational characteristics (see below) | See below |
| Q | Vector of dummies indicating the time (bi-annual) of sale | Equal to one if transaction occurs in indicated bi-annual period, zero otherwise (first half 1996 is omitted category) |
| LGA | Vector of dummies indicating the local government area that each vacant lot transaction belongs to | Equal to 1 if property is in LGA x, zero otherwise (Bayside LGA is omitted category). |
| Distance to CBD (log) | Continuous variable indicating distance from land parcel i to the CBD | Log of distance to the CBD in km |
| Distance to train station (log) | Continuous variable indicating distance from land parcel i to the nearest train station | Log of distance to nearest train station in km |
| Distance to activity centre (log) | Continuous variable indicating distance from land parcel i to the nearest principal or major activity centres | Log of distance to nearest activity centre in km |
| Distance to primary school (log) | Continuous variable indicating distance from land parcel i to the nearest primary school | Log of distance to nearest primary school in km |
| Distance to secondary school (log) | Continuous variable indicating distance from land parcel i to the nearest secondary school | Log of distance to nearest secondary school in km |
| Land size hectares (log) | Continuous variable indicating size of the land parcel | Log of the size of the land plot in hectares |
| Rural zone dummy | Dummy variable indicating properties located in area that is zoned for rural development | Equal to 1 if the property is an area zoned as residential, zero otherwise (omitted category) |
| Residential zone dummy | Dummy variable indicating properties located in area that is zoned for residential development | Equal to 1 if the property is an area zoned as residential, zero otherwise |
| Industrial zone dummy | Dummy variable indicating properties located in area that is zoned for industrial development | Equal to 1 if the property is an area zoned as industrial, zero otherwise |
| Business zone dummy | Dummy variable indicating properties located in area that is zoned for commercial/business development | Equal to 1 if the property is an area zoned as commercial/business, zero otherwise |
| Environmental significance overlay | Dummy variable indicating land parcels with environmental | Equal to 1 if land is in area regarded as environmentally |

| Variable name | Definition | Measurement |
|---|---|---|
| dummy | significance | significant, zero otherwise |
| Land subject to inundation overlay dummy | Dummy variable indicating land in an area prone to flooding | Equal to 1 if land is in flood area, zero otherwise |
| Wildfire management overlay dummy | Dummy variable indicating land in an area where the risk of wildfire is significant and likely to pose a threat to life and property | Equal to 1 if land is in wildfire area, zero otherwise |
| Heritage overlay dummy | Dummy variable indicating areas regarded as places of natural, historical or cultural significance | Equal to 1 if land is in heritage area, zero otherwise |
| Improvements at sale dummy | Dummy variable indicating land parcels with improvements at sale (over $20 000) | Equal to 1 if the property has improvements, zero otherwise |

# A2 Hedonic Land Value Model- Regression Results

**Table A2: Hedonic Land Value Model-Regression Results**

| **Variables** | | **Land Sale Price-Log** |
|---|---|---|
| Residential zone dummy | | 0.153*** |
| | | (0.0562) |
| Industrial zone dummy | | 0.965*** |
| | | (0.328) |
| Business zone dummy | | 0.138** |
| | | (0.0588) |
| Environmental Significance Overlay | | 0.214*** |
| | | (0.0337) |
| Wildfire Management Overlay | | -0.267*** |
| | | (0.0539) |
| Heritage Overlay | | 0.186*** |
| | | (0.0454) |
| Land Area (log) | | 0.471*** |
| | | (0.00931) |
| Distance from CBD (log) | | -0.817*** |
| | | (0.0293) |
| Distance from Train Station (log) | | -0.0252*** |
| | | (0.00823) |
| Distance from Activity Centre (log) | | -0.0140 |
| | | (0.0110) |
| Distance from Primary School (log) | | 0.0557*** |
| | | (0.00692) |
| Distance from High School (log) | | 0.00305 |
| | | (0.00511) |
| Local Government Area Indicator Variables | Banyule | -0.257*** |
| | | (0.0504) |
| | Bayside | 0.807*** |
| | | (0.0420) |
| | Boroondara | 0.291*** |
| | | (0.0624) |
| | Brimbank | -0.707*** |
| | | (0.0346) |

| Variables | | Land Sale Price-Log |
|---|---|---|
| | Cardinia | 0.0560* |
| | | (0.0332) |
| | Darebin | -0.300*** |
| | | (0.0460) |
| | Frankston | 0.191*** |
| | | (0.0288) |
| | Glen Eira | 0.283*** |
| | | (0.0547) |
| | Greater Dandenong | 0.0687 |
| | | (0.0439) |
| | Hobsons Bay | -0.160*** |
| | | (0.0523) |
| | Hume | -0.413*** |
| | | (0.0288) |
| | Kingston | 0.451*** |
| | | (0.0346) |
| | Knox | 0.0552 |
| | | (0.0360) |
| | Manningham | 0.110** |
| | | (0.0474) |
| | Maribyrnong | -0.732*** |
| | | (0.0558) |
| | Maroondah | -0.0113 |
| | | (0.0502) |
| | Melbourne | -0.622*** |
| | | (0.151) |
| | Melton | -0.545*** |
| | | (0.0270) |
| | Monash | 0.314*** |
| | | (0.0393) |
| | Moonee Valley | -0.229*** |
| | | (0.0573) |
| | Moreland | -0.531*** |
| | | (0.0493) |

| Variables | | Land Sale Price-Log |
|---|---|---|
| | Mornington Peninsula | 0.691*** |
| | | (0.0270) |
| | Nillumbik | -0.222*** |
| | | (0.0381) |
| | Stonnington | 0.318*** |
| | | (0.0947) |
| | Whittlesea Council | -0.389*** |
| | | (0.0292) |
| | Wyndham | -0.463*** |
| | | (0.0265) |
| | Yarra City Council | -0.923*** |
| | | (0.0965) |
| | Yarra Ranges | -0.116*** |
| | | (0.0324) |
| | Whitehorse | 0.123** |
| | | (0.0494) |
| Constant | | 11.81*** |
| | | (0.128) |
| Observations | | 5,829 |
| R-squared | | 0.728 |

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

## A3 Equations to solve for proposed land tax rates

If tax rates are represented by the term $\alpha$ and each tax bracket is indexed by *i*, then the constraints can be represented by the inequality $\alpha_{i+1} > \alpha_i$.

We assume that there will be seven tax brackets under the new land tax system, consistent with the number of tax brackets under the current 2006 land tax system. Hence, our objective functions are formulated as per the following set of linear equations:

$$R_1 = \alpha_1 L_1 A_1 = 0 \quad (1)$$

$$R_2 = \alpha_2 (L_2 - T_1) A_2 \quad (2)$$

$$R_3 = \alpha_2 (T_2 - T_1) A_3 + \alpha_3 (L_3 - T_2) A_3 \quad (3)$$

$$R_4 = \alpha_2 (T_2 - T_1) A_4 + \alpha_3 (T_3 - T_2) A_4 + \alpha_4 (L_4 - T_3) A_4 \quad (4)$$

$$R_5 = \alpha_2 (T_2 - T_1) A_5 + \alpha_3 (T_3 - T_2) A_5 + \alpha_4 (T_4 - T_3) A_5 + \alpha_5 (L_5 - T_4) A_5 \quad (5)$$

$$R_6 = \alpha_2 (T_2 - T_1) A_6 + \alpha_3 (T_3 - T_2) A_6 + \alpha_4 (T_4 - T_3) A_6 + \alpha_5 (T_5 - T_4) A_6 + \alpha_6 (L_6 - T_5) A_6 \quad (6)$$

$$R_7 = \alpha_2 (T_2 - T_1) A_7 + \alpha_3 (T_3 - T_2) A_7 + \alpha_4 (T_4 - T_3) A_7 + \alpha_5 (T_5 - T_4) A_7 + \alpha_6 (T_6 - T_5) A_7 + \alpha_7 (L_7 - T_6) A_7 \quad (7)$$

where

$R_i$ = revenue generated from tax bracket i

$\alpha_i$ = marginal tax rate in bracket i; $\alpha_1 = 0$

$T_i$ = land value per square metre threshold beyond which the marginal tax rate *i*+1 applies

$A_i$ = Is the total land area (in square metre) covered by the total number of land plots in tax bracket *i*

$L_i$ = average land value in tax bracket *i* weighted by land size.

The $\alpha_i$ are solved subject to

$$R_2 + R_3 + R_4 + R_5 + R_6 + R_7 = \$512.3m \quad (8)$$

$$\alpha_1 < \alpha_2 \quad (9)$$

$$\alpha_2 < \alpha_3 \quad (10)$$

$$\alpha_3 < \alpha_4 \quad (11)$$

$$\alpha_4 < \alpha_5 \quad (12)$$

$$\alpha_5 < \alpha_6 \quad (13)$$

$$\alpha_6 < \alpha_7 \quad (14)$$

Equation 1 can be deleted from this list of equations as $\alpha_1 = 0$ and therefore $R_1 = 0$. The remaining revenue equations (2) to (7) do not incorporate $\alpha_1$ so equation (9) can also be removed. We are able to specify values for $T_i$, $A_i$ and $L_i$ as described in the main text. Hence, we are left with 12 equations and 12 unknowns, the latter being $\alpha_2$ to $\alpha_7$ and $R_2$ to $R_7$.

## A4 Aggregate revenue from proposed land tax and stamp duty regimes by Melbourne municipalities

**Table A3: Aggregate revenue from proposed land tax and stamp duty regimes by Melbourne municipalities**

| Municipality | Proposed Land Tax Schedule | | | | Stamp Duty | | | |
|---|---|---|---|---|---|---|---|---|
| | Revenue | | Total Land Area $m^2$ | Mean Land Value $ per $m^2$ | Revenue | | Number of Transactions | Mean Property Price $'000s |
| | Sum $(millions) | % of Aggregate Revenue | | | Sum $(millions) | % of Aggregate Revenue | | |
| Boroondara | 218 | 14% | 28,390,257 | 1,185 | 107 | 8% | 2,146 | 923 |
| Bayside | 126 | 8% | 15,416,790 | 1,165 | 80 | 6% | 1,481 | 996 |
| Stonnington | 125 | 8% | 10,381,744 | 1,839 | 77 | 6% | 1,187 | 1,192 |
| Glen Eira | 92 | 6% | 17,509,999 | 874 | 51 | 4% | 1,495 | 642 |
| Monash | 86 | 6% | 33,811,746 | 572 | 52 | 4% | 2,275 | 457 |
| Kingston | 80 | 5% | 22,880,954 | 704 | 43 | 3% | 1,976 | 439 |
| Port Phillip | 76 | 5% | 3,696,738 | 2,808 | 46 | 4% | 1,024 | 829 |
| Moreland | 76 | 5% | 29,233,705 | 708 | 35 | 3% | 1,920 | 374 |
| Moonee Valley | 72 | 5% | 15,217,629 | 933 | 33 | 3% | 1,374 | 476 |
| Darebin | 68 | 5% | 20,227,372 | 726 | 34 | 3% | 1,792 | 393 |
| Whitehorse | 64 | 4% | 28,605,508 | 541 | 47 | 4% | 2,001 | 463 |
| Hobsons Bay | 51 | 3% | 14,572,470 | 734 | 28 | 2% | 1,426 | 405 |
| Mornington Peninsula | 43 | 3% | 65,503,087 | 342 | 92 | 7% | 4,847 | 391 |
| Manningham | 42 | 3% | 28,687,420 | 508 | 46 | 4% | 1,564 | 560 |
| Banyule | 41 | 3% | 24,562,343 | 478 | 35 | 3% | 1,649 | 422 |
| Maribyrnong | 36 | 2% | 8,638,288 | 866 | 23 | 2% | 1,312 | 359 |
| Yarra | 35 | 2% | 5,195,142 | 1,417 | 31 | 2% | 1,028 | 583 |
| Melbourne | 29 | 2% | 1,514,796 | 2,630 | 17 | 1% | 420 | 764 |

| Municipality | Proposed Land Tax Schedule | | | | Stamp Duty | | | |
|---|---|---|---|---|---|---|---|---|
| | Revenue | | Total Land Area $m^2$ | Mean Land Value $ per $m^2$ | Revenue | | Number of Transactions | Mean Property Price $'000s |
| | Sum $(millions) | % of Aggregate Revenue | | | Sum $(millions) | % of Aggregate Revenue | | |
| Knox | 22 | 1% | 36,444,376 | 352 | 36 | 3% | 2,340 | 330 |
| Casey | 19 | 1% | 47,234,572 | 306 | 63 | 5% | 6,070 | 244 |
| Greater Dandenong | 17 | 1% | 19,579,640 | 380 | 23 | 2% | 1,813 | 283 |
| Hume | 14 | 1% | 31,704,623 | 311 | 33 | 3% | 3,435 | 232 |
| Frankston | 11 | 1% | 29,267,796 | 307 | 38 | 3% | 3,052 | 277 |
| Whittlesea | 11 | 1% | 25,457,537 | 324 | 29 | 2% | 2,759 | 248 |
| Wyndham | 10 | 1% | 28,239,082 | 290 | 37 | 3% | 4,704 | 202 |
| Brimbank | 10 | 1% | 29,730,348 | 294 | 31 | 2% | 2,940 | 248 |
| Maroondah | 10 | 1% | 24,852,944 | 318 | 24 | 2% | 1,469 | 346 |
| Nillumbik | 8 | 1% | 15,002,931 | 344 | 20 | 2% | 1,055 | 393 |
| Melton | 6 | 0.4% | 20,769,956 | 246 | 23 | 2% | 3,091 | 193 |
| Cardinia | 5 | 0.3% | 14,307,955 | 285 | 18 | 1% | 1,934 | 227 |
| Yarra Ranges | 4 | 0.3% | 47,839,114 | 199 | 38 | 3% | 2,818 | 297 |
| Total | 1,507 | 100% | 744,476,862 | 576 | 1,290 | 100% | 68,397 | 389 |

## A5 Does the tax base make a difference? A counterfactual comparison

A key difference between the Henry Review's proposed land tax and the current land tax regime is that the former defines the tax base as land value per square metre while the latter uses the cumulative land value of a landowner's total land holdings. In this section we ask the question of whether the definition of tax base makes a difference to the pattern of land tax liabilities by performing a counterfactual comparison of the proposed and current land tax schedule. This comparison offers such insights as whether altering the tax base definition would alter the land tax patterns.

The current 2006 land tax schedule is applied *as if it were a broad based tax* and the land tax rates are re-solved (using aggregate land value as the tax base) to achieve an aggregate land tax revenue of $1.5 billion dollars as the proposed land tax has been designed to achieve (see Appendix Table A4). As with the proposed land tax schedule, we assume that the tax rates under the counterfactual schedule would rise in a linear fashion. Note here that because we are unable to observe which properties are owned by the same landowner, the tax base is defined as the land value of each land plot. These ensure that the only difference between the proposed and counterfactual land tax schedules lies in the per square metre definition of the tax base. Hence, we are able to compare outcomes under two different tax base definitions, all other things being equal.

Appendix Table A4 contains a comparison of the rates and thresholds under the proposed and counterfactual land tax schedules. Unsurprisingly, the marginal tax rates under the two alternative schedules are very similar, rising from 0 per cent, to approximately 0.8 per cent in the second tax bracket, to 1.25 per cent in the highest tax bracket. This is because under the proposed land tax schedules, the land tax liability is calculated on the basis on land value per metre squared and the size of the land (see method section). Under the current schedule the land tax liability is calculated on the basis of land value per land plot which is the product of land value per metre squared and land size. Any differences in outcomes under the two schedules would therefore be attributed to the fact that the land plots are ranked differently such that land plots that fall under, say, the fifth tax bracket under the proposed schedule may fall under the second tax bracket under the current schedule.

**Table A4: Rates and thresholds under the proposed and counterfactual land tax schedules**

| Land Tax Bracket | Count | Proposed Land Tax | | Counterfactual Land Tax[a] | |
|---|---|---|---|---|---|
| | | Thresholds $ per $m^2$ | Marginal Tax Rate % | Thresholds $ per land plot | Marginal Tax Rate % |
| 1 | 305,163 | Less than $286.54 | 0 | Less than $200,000 | 0 |
| 2 | 593,907 | $286.54 to less than $974.45 | 0.921 | $200,000 to less than $540,000 | 0.802 |
| 3 | 104,152 | $974.45 to less than $2000.22 | 0.011 | $540,000 to less than $900,000 | 0.892 |
| 4 | 19,197 | $2000.22 to less than $3025.30 | 0.101 | $900,000 to less than $1,190,000 | 0.982 |
| 5 | 6,907 | $3025.30 to less than $4145.28 | 1.191 | $1,190,000 to less than $1,620,000 | 1.072 |
| 6 | 3,075 | $4145.28 to less than $5697.08 | 1.281 | $1,620,000 to less than $2,700,000 | 1.162 |
| 7 | 790 | $5697.08 and over | 1.371 | $2,700,000 and over | 1.252 |

Note: a. The current land tax schedule is applied as if it were a broad based tax.

Table A5 compares the aggregate revenue generated the proposed and counterfactual land tax schedules. The revenue distribution is more skewed towards the lower tax brackets when land value per square metre is used as the tax base. Over half of all revenue is generated in the second tax bracket under the proposed land tax, compared to 45 per cent under the counterfactual schedule. The proportion of total revenue generated by each successively higher tax bracket declines under both schedules.

**Table A5: Aggregate revenue from proposed and counterfactual land tax schedules by tax bracket**

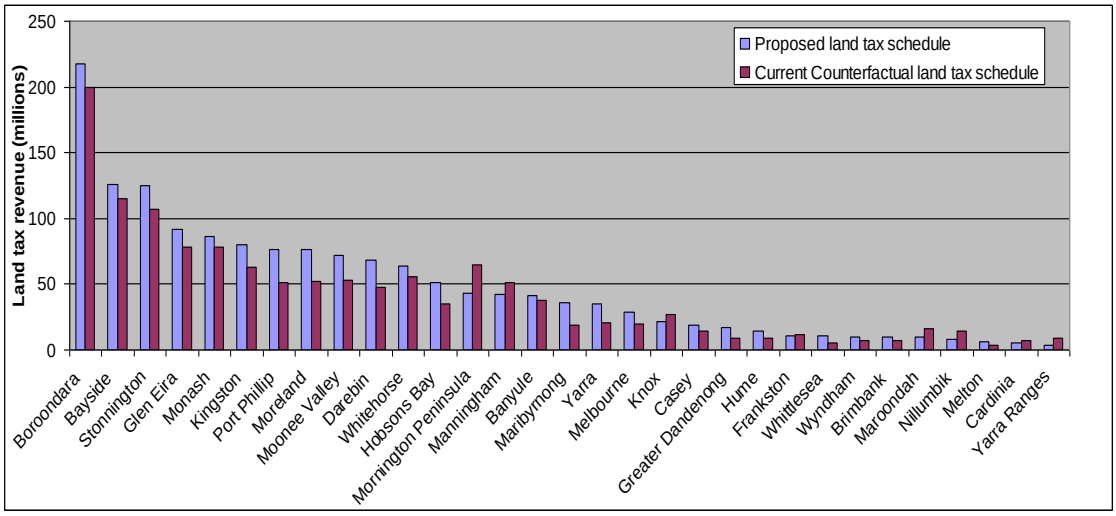
| Tax Bracket | Count | Revenue from Proposed Land Tax | | Revenue from Counterfactual Land Tax[a] | |
|---|---|---|---|---|---|
| | | Sum $(millions) | % of Aggregate Revenue | Sum $(millions) | % of Aggregate Revenue |
| 1 | 305,163 | 0.00 | 0% | 0.00 | 0% |
| 2 | 593,907 | 776 | 51% | 583 | 45% |
| 3 | 104,152 | 504 | 33% | 411 | 32% |
| 4 | 19,197 | 127 | 8% | 135 | 10% |
| 5 | 6,907 | 55 | 4% | 73 | 6% |
| 6 | 3,075 | 29 | 2% | 54 | 4% |
| 7 | 790 | 16 | 1% | 35 | 3% |
| Total | 1,033,191 | 1,507 | 100% | 1,290 | 100% |

Note: a. The current land tax schedule is applied as if it were a broad based tax.

Figure A1 offers a graphical overview of the distribution of revenue by municipalities. In contrast with Figure 9, we find here that the revenue pattern is very similar under

both the proposed and counterfactual scenarios. Looking from left to right in Figure 17, Boroondara accounts for the largest amount of revenue generated over $200 million dollars under both scenarios, followed by Bayside and Stonnington which account for half the revenue Boroondara generates (approximately $120 million each). The amount of revenue generation drops down rapidly to under $20 million dollars from municipalities like Casey and Greater Dandenong. The amount and proportion of total revenue generated by each municipality is very similar across the two schedules. This is because more expensive land also tends to have higher land plot values.

**Figure A1: Aggregate revenue from proposed and counterfactual land tax schedules[a] by Melbourne municipalities**




Note: a. The current land tax schedule is applied as if it were a broad based tax.

Similarly, while not shown here, the spatial patterns of revenue distribution by 10 kilometre concentric rings from the CBD remain similar across both schedules. It is, however, worthwhile noting that the proportion of revenue accounted for by land plots within 10 kilometres of the CBD is 46 per cent under the proposed schedule, which is somewhat higher than the 41 per cent that would be generated by the same land plots within the 10 kilometre ring if the counterfactual schedule were applied. This can be explained by the fact that land nearest the CBD is extremely expensive when measured on a per square metre basis; the average value of land plots within the 10 kilometre ring is $1335 per square metre, 2.5 times the value of land plots within the 10–20 kilometre ring. On the other hand, the average price of land plots within the 10 kilometre ring is only around 1.5 times the price of land plots within the 10–20km ring.

Table A6 asks whether the tax burdens differ across land size under the two alternative land tax schedules. The land plots are ranked from the smallest to the largest, and then divided into quintiles according to land area. Columns 2 and 3 show that small land plots account for a disproportionately high tax burden under the proposed schedule. Despite a relatively low assessable land area, the lowest quintile by size accounts for over one-third of total revenue because small plots are especially expensive at over $1000 per square metre. We find a different pattern when the counterfactual schedule is applied. While land plots in the lowest quintile attract quite high values (average of $345 000) due to small land plots being typically quite expensive, land plots in the highest quintile have even higher aggregate land plot values ($393 000) on account of the fact that each plot covers a larger area. Hence, when the tax base is defined on a land plot value basis, we find that land plots in the top quintile account for a disproportionately high proportion of total revenue (28%).

**Table A6: Aggregate revenue from proposed and counterfactual land tax schedules by land area (quintiles)**

| **Proposed Land Tax Schedule** | | | | **Counterfactual Land Tax Schedule[a]** | | |
|---|---|---|---|---|---|---|
| **Land Area $m^2$** | **Revenue** | | **Mean Land Value $ per $m^2$** | **Revenue** | | **Mean Land Value $'000s** |
| | **Sum $(millions)** | **% of Aggregate Revenue** | | **Sum $(millions)** | **% of Aggregate Revenue** | |
| **124 < 533** | 478 | 32% | 1,087 | 279 | 22% | 345 |
| **534 < 608** | 234 | 16% | 484 | 164 | 13% | 276 |
| **609 < 688** | 266 | 18% | 484 | 217 | 17% | 313 |
| **689 < 821** | 284 | 19% | 469 | 268 | 21% | 347 |
| **822 < 4,112** | 244 | 16% | 351 | 363 | 28% | 393 |
| Total | 1,507 | 100% | 575.60 | 1,290 | 100% | 335 |

Note: a. The current land tax schedule is applied as if it were a broad based tax.

Overall, we find that altering the tax base definition from a land plot value basis to a value per square metre basis would shift the land tax burden from large to small land plots, and in doing so shifts the tax burden from the outer suburban fringe to the inner suburbs.[27]

[27] Revenue patterns by building age and overlay are similar across both schedules.

## A6 Aggregate revenue from proposed land tax and stamp duty regimes by age of building

**Table A7: Aggregate revenue from proposed land tax and stamp duty regimes by age of building**

| | Proposed Land Tax Schedule | | | Stamp Duty | | |
|---|---|---|---|---|---|---|
| **Age of Building** | **Revenue** | | **Mean Property Price $ per m$^2$** | **Revenue** | | **Mean Property Price $'000s** |
| | **Sum $(millions)** | **% of Aggregate Revenue** | | **Sum $(millions)** | **% of Aggregate Revenue** | |
| **0 < 10 yrs** | 197 | 13% | 497 | 237 | 24% | 418 |
| **10 < 20 yrs** | 116 | 8% | 444 | 111 | 11% | 376 |
| **20 < 30 yrs** | 104 | 7% | 389 | 93 | 9% | 348 |
| **30 < 40 yrs** | 134 | 9% | 398 | 107 | 11% | 334 |
| **40 < 50 yrs** | 156 | 10% | 466 | 96 | 10% | 353 |
| **50 < 60 yrs** | 179 | 12% | 593 | 84 | 8% | 408 |
| **60 < 70 yrs** | 79 | 5% | 814 | 36 | 4% | 547 |
| **70 < 80 yrs** | 102 | 7% | 918 | 47 | 5% | 702 |
| **80 < 90 yrs** | 143 | 10% | 1,058 | 61 | 6% | 644 |
| **90 < 100 yrs** | 99 | 7% | 1,318 | 43 | 4% | 715 |
| **100 yrs <** | 174 | 12% | 2,055 | 78 | 8% | 741 |
| Total | 1,483 | 100% | 580 | 993 | 100% | 424 |

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Australian Housing and Urban Research Institute
Level 1, 114 Flinders Street, Melbourne Victoria 3000
Phone +61 3 9660 2300 Fax +61 3 9663 5488
Email information@ahuri.edu.au Web www.ahuri.edu.au