The Price Cannot be Right: Taxation, Sub-Intrinsic-Value Housing Bubbles, and Financial Instability

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Abstract

A "general formula" for the rental yield of a property is derived in terms of an exponential appreciation rate, a discount rate, a holding time, and a set of tax parameters, on the hypothesis that prices reflect net present values (NPVs) of future cash flows. Special cases are noted and interpreted. The formula explains the counterintuitive observation that a stamp duty on the purchaser can reduce the price by more than the value of the duty, and similarly predicts that a subsidy for the purchaser can raise the price by more than the value of the subsidy. But for some combinations of inputs, the formula predicts prices that clearly exceed buyers' capacity to service loans. If the financial system tries to support such high prices, there will be a sub-intrinsic-value bubble – a condition in which prices, although lower than NPVs, are unsustainable due to unserviceable debt. The suggested remedy is to change the tax mix so as to bring NPVs within buyers' capacity to service loans. This can be done by relying more heavily on land tax or capital-gain tax. As the latter does not need to be paid out of current income, it is more conducive to home ownership.

Keywords: efficient markets, property, bubbles, financial instability, economic rent

1. Introduction

If the real-estate market were efficient, the price of a property would not systematically deviate from the net present value (NPV), which is the discounted present value (PV) of the future cash flows imputable to the property. Future increases in the rental value, and therefore in the price, would be reflected in the current price. Hence ownership of landed property would not systematically yield super-normal returns ("economic rent") unless the property had been acquired for less than the market price.[4]

Critics of the efficient-market hypothesis might allege that the applied discount rate can be too low, either because central banks impose artificially low interest rates (the "Austrian" explanation), or because risk and uncertainty are underpriced due to a period of steady growth (the "Minskian" explanation) or the rise of "originate-to-distribute" lending (whereby credit risk becomes someone else's problem). Or they might allege that an initially rational market can degenerate into a Ponzi scheme as the discounting of increasing rents gives way to the pursuit of capital gains, then to belief in the greater fool, then to belief in the greater believer in the greater fool, and so on, until belief becomes foolishness. These theories all imply that property can be overpriced – in which case the buyers, far from being net recipients of economic rent, are losers, not only by comparison with their counterparties but also in absolute terms. According to these theories, a bubble is a condition in which prices exceed NPVs, and the subsequent "burst" is the inevitable correction, which begins when prices are furthest from NPVs.

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[3] Disclosure: The author is not exposed to shares or real estate except through his compulsory superannuation. The Henry George Foundation and the Henry George Club hold investment portfolios whose compositions may change from time to time and may include shares and real estate.
[4] Here I use the term *economic rent* in the micro-economic sense. From the macro viewpoint, as unimproved land has no cost of production, its entire rental value is economic rent. But from the micro viewpoint, land usually has a cost of acquisition, in which case only super-normal returns on that cost are economic rent. Thus the economic rent as defined from the macro viewpoint may not accrue to the current owners.

This paper, in contrast, proposes that NPVs can exceed the maximum debts that buyers can service out of current income, in which case the buyers, in their competitive efforts to drive up prices towards NPVs, may take on more debt than they can service. In this scenario, which I call a sub-intrinsic-value bubble,[5] prices become unsustainably high while remaining below NPVs. The ensuing "burst" is the belated realization that current prices require too much debt and begins when prices are, ironically, closest to NPVs. Owners who bought at the top of the market are losers in the sense that they would have done better to buy at another time, but not in the sense that they paid more than NPVs; on the contrary, having paid less than NPVs, they will eventually be net recipients of economic rent if they can hold their properties for long enough (a big "if"). In the meantime, the higher the price/rent ratio, the higher the fraction of the rent that will accrue to the lender under the guise of the interest margin.

After the bubble bursts and the bad debts are somehow worked out, prices will start rising again, and the cycle will repeat. But in the case of a sub-intrinsic-value bubble, the price of a property at any stage of the cycle, being less than the NPV, will be determined by what one can borrow against the property, and will bear little relation to its rental value in the short term. Only in the long term will there be a proportionality between prices and rents, as the capacity to service loans and the capacity to pay rent are both constrained by current income.

There is no inherent contradiction in the claim that NPVs can exceed buyers' capacity to service debt; NPV is a balance-sheet measure, while debt-servicing capacity is a cash-flow constraint. Moreover, it is well known that the NPV of an exponentially growing rent stream increases without limit as the growth rate approaches the discount rate, in which case the interest on the NPV likewise increases without limit. Furthermore, the relevant rental growth rate is that of a fixed address, and tends to be faster than that of the "average" or "median" property, which moves further from city centers as population grows, and whose rental value is limited by per capita income. The growth rate for a fixed address, being a function of income growth and population growth, is not constrained by the discount rate.

As the "sub-intrinsic-value bubble" theory concerns cases in which prices remain below NPVs, it is obviously not consistent with an efficient market. But it is consistent with rationality in the sense that buyers are attempting to drive prices towards NPVs. It is consistent with the "greater fool" theory if the primary foolishness is understood as over-estimation of one's capacity to service loans. It is consistent with the "Austrian" theory if artificially low interest rates are blamed for the over-estimation. It is consistent with the "Minskian" theory, not quite in the sense that "stability is destabilizing", but rather in the sense that striving after stability is destabilizing: stability is not achieved until prices reach NPVs, which they cannot, because the associated debts would be unserviceable.

If a property market were suffering from a sub-intrinsic-value bubble, the existence of the bubble would be deniable. The "bulls" would be able to claim that prices were more than justified by "fundamentals", that regulation of lending should be relaxed to let buyers borrow amounts commensurate with NPVs (which would always be sufficient to pay off any loans that became unserviceable due to loss of income), that prospective buyers should buy now to avoid higher prices, and that any talk of a bubble would be irresponsible and dangerous because it might damage confidence. Hence, when the bubble started to deflate, the bulls could further claim that the improvement in "affordability" had created a "buyers' market", which could not last, because prices were even further below NPVs. Hence, when the crash gathered momentum and led to financial crisis and recession, the wounded bulls would claim that the fall in prices, and not the preceding rise, had been irrational, that "no one could have seen this coming", and that government interventions, other than those calculated to support prices and protect creditors, were unwarranted. These predictions bear some resemblance to recent history, suggesting that sub-intrinsic-value bubbles are worth investigating.

The investigation in this paper is mathematical: the gross rental yield is expressed in terms of a set of parameters describing the tax system, the property market, and the financial market, on the hypothesis that the price is the NPV. For values of the parameters that predict impossibly low rental yields – that is, impossibly high prices – the actual market prices will remain below NPVs (contradicting the hypothesis), but

[5] This term equates the "intrinsic" value with the NPV—not with the cost of production, which excludes the unimproved land value. Possible alternative terms are *sub-NPV bubble* and *sub-fundamental-value bubble*.

the market will tend to form sub-intrinsic-value bubbles, which in turn will cause financial crises. This paper does not quantitatively model the economic cycle. Much less does it predict a cycle of cycles, with the outer cycle ending in a "great moderation" before a great collapse (cf. Keen, 2011: 334, 374). It merely finds conditions, including tax settings, under which equilibrium and "efficient" markets lead to absurd price/rent ratios.

2. Simplified analysis: Property held for a short time

Suppose that a property is purchased, held for a period T, and then resold. Suppose further that T is short enough to allow **linearizing approximations**: e.g., if P_0 is the purchase price and y is the rental yield and g (for growth) is the appreciation rate, then the rent received during the holding period is near enough to yP_0T, and the capital gain on resale is near enough to gP_0T.

The disadvantage of assuming a short holding time is the loss of generality (to be rectified in Section 4). The advantage is a simple formula for rental yield, incorporating all desired parameters of the tax system and allowing a qualitative description of the effects of the various taxes on property prices. The formula can first be derived for the case in which there are no transaction costs (other than capital-gains tax, which is handled separately). Transaction costs can then be introduced by deducting them from the capital gain.

2.1 Without transaction costs

Concerning the tax system, I make the following assumptions and definitions:

- h is the **holding charge rate**, expressed as a fraction of the current market price per unit time, and is constant over the holding period. It allows for all recurrent property taxes or "rates" imposed by all levels of government, plus any maintenance costs and body corporate fees. For the purpose of defining h, the "current market price" is inclusive of any buildings or other improvements (even if, in order to avoid penalizing construction, the legislated tax rate is levied on the site value or unimproved value).

- u is the fraction of **current income** and current expenses remaining after income tax, and is constant over the holding period. If the marginal tax rate is τ, then $u = 1 - \tau$ (for example, a tax rate of 30% gives u =0.7=70%). For the purposes of this paper, u applies to property income and associated expenses. It need not apply to other sources of income, such as labor (although it probably does under current policies).

- v is the fraction of a **capital gain** remaining after income tax, and is constant. (For example, if the capital-gains-tax rate is 15%, then $v = 0.85 = 85\%$; and if capital gains are untaxed, as for owner-occupied residential properties in Australia, then $v = 1$.)

- Any **indirect taxes** or **consumption taxes** need not be modeled explicitly, because they effectively devalue the currency in which all other quantities are measured, without changing the proportionalities between those quantities.

(Assumptions and definitions given as bullet points are retained throughout the paper.)

Under equilibrium conditions, the cost must equal the benefit over the purchase-resale cycle; that is, the rent received or saved plus the capital gain must equal the interest paid or forgone plus the holding cost, where all quantities are after tax. Let P_0 be the purchase price, y the gross rental yield, g the appreciation rate, and i the pre-tax interest rate. Then, under our linearizing approximations, the rent received or saved during the holding period is yP_0T, which becomes uyP_0T after tax; and the capital gain is gP_0T, which becomes vgP_0T

after tax; and the holding cost is hP_0T, which becomes uhP_0T after tax; and the interest is iP_0T, which becomes uiP_0T after tax. With these substitutions, the cost-benefit balance becomes

$$uyP_0T + vgP_0T \approx uhP_0T + uiP_0T. \quad (1)$$

Canceling the common factor and solving for y, we get

$$y \approx h + i - \frac{v}{u}g. \quad (2)$$

(If $= u$, this result simplifies to $y \approx h + i - g$, which may be more familiar to the reader. If, in addition, we set $h = 0$ and interpret i as a discount rate, we obtain the familiar rule that "the yield is the discount rate minus the growth rate." Notice that these familiar results are less general than Eq. (2), which in turn is less general than the results to follow.)

Eq. (2) implies that the holding charge rate h and the interest rate i are additive (that is, their combined influence on y depends on their sum), and that capital gains are magnified by the factor v/u relative to current income and expenses.

For a given rent, the price increases without limit as $y \to 0$. And there is nothing in Eq. (2) to prevent y from falling to zero. A high price (small y) is especially likely if the holding charge is low (i.e., h is small) or capital gains are taxed at a lower rate than current income ($v/u > 1$).

2.2 With transaction costs

To account for transaction costs (not including capital-gains tax), I further assume:

- s is the stamp duty rate payable by the buyer on the purchase price of a property, and is constant. A negative value indicates a net grant or subsidy.

- r is the resale cost payable by the seller, expressed as a fraction of the resale price, and is constant. It includes any commissions and legal fees and any "vendor stamp duty" on the sale price, but not capital-gains tax.

- For the purpose of calculating the taxable capital gain, resale costs are deducted from the resale price, and any stamp duty on the purchase price is included in the cost base; in other words, the transaction costs of the purchase and resale are deducted from the taxable capital gain.

In the derivation of Eq. (1), the purchase price is P_0, on which the stamp duty is sP_0 , and the resale price is $P_0(1 + gT)$, on which the resale cost is $rP_0(1 + gT)$. When the stamp duty and resale cost are deducted from the pre-tax capital gain in Eq. (1), namely gP_0T, the net taxable capital gain is

$$\left[g(1 - r) - \frac{s + r}{T}\right]P_0T, \quad (3)$$

which replaces gP_0T in Eq. (1). The interest term in Eq. (1), namely uiP_0T, must be replaced by $ui(1 + s)P_0T$, because interest is paid or forgone on $(1 + s)P_0$ instead of P_0. Making these substitutions in Eq. (1) and simplifying, we obtain

$$y \approx h + i(1 + s) + \frac{v}{u}\left[\frac{s + r}{T} - g(1 - r)\right]. \quad (4)$$

If s is small, h and i are still approximately additive. Lower holding costs still mean lower rental yields (higher prices). If T is long enough to make the square-bracketed expression negative – i.e. long enough to make the gross capital gain outweigh the transaction costs – then it is still true that concessional taxation of capital gains ($v/u > 1$) means lower yields (higher prices).

Eq. (4), unlike Eq. (2), includes T, and implies that a longer holding time means a lower yield, hence a higher price. This means in practice that, all else being equal, buyers who intend to hold for longer will make higher bids.

Eq. (4) further implies that the stamp duty rate s raises y and therefore reduces the price/rent ratio. The same is true of the resale cost r (at least if $g \geq 0$). We shall see in Section 7 that, contrary to the prediction of conventional supply-and-demand curves, the reduction in price due to stamp duty can exceed the value of the duty.

3. Assumptions and definitions

The assumptions and definitions given in the preceding bulleted lists are retained throughout the paper. For the general case, in which the holding time T is not necessarily short, I make the following assumptions concerning the property market and the financial market:

- At time t, the gross rent of the property under study is

$$E = E_0 e^{gt}, \tag{5}$$

  where E_0 and g are constant during the holding period. In other words:

  - E_0 is the initial rent (at $t = 0$); and
  - g is the continuously compounding rental **growth rate**; that is, $g = E'/E$, where the prime ($'$) denotes differentiation w.r.t. time (e.g., if $g = 0.04\,\mathrm{yr}^{-1}$, the growth rate is 4% "per annum" over an infinitesimal period, but compounds to slightly more than 4% over a full year).

- i is the continuously-compounding **grossed-up discount rate**, and is constant for future cash flows through the holding period; in other words, the continuously-compounding *after-tax* discount rate is ui , so that a future cash flow at time t must be multiplied by

$$e^{-uit} \tag{6}$$

  to find its present value (PV) at time 0. This notation does *not* imply that the grossed-up discount rate is "given" (exogenous) and that the after-tax rate is proportional to u; it is equally compatible with (e.g.) the hypothesis that ui is "given" so that i is *inversely* proportional to u. Nor does it imply that i is a pre-tax discount rate.[6] But it is convenient because there are special cases (including those already considered) in which i can be interpreted as the pre-tax *interest* rate.

[6] For the purpose of calculating a PV, the *after-tax* discount rate is applied to *after-tax* cash flows. In contrast, the "*pre*-tax discount rate" is a notional discount rate that can be applied to the corresponding *pre*-tax cash flows to obtain the same PV (Lonergan, 2009:42). In the *special case* of a perpetuity with no growth, dividing the pre-tax annual flow by the grossed-up discount rate happens to yield the correct PV, so that the "pre-tax" discount rate is the grossed-up rate in this case. In general, however, the "pre-tax" discount rate is not necessarily the grossed-up rate, even if all pre-tax cash flows are simply grossed-up after-tax cash flows (Lonergan, 2009:44). If the proportionality between pre-tax and after-tax cash flows is not uniform (e.g. because taxable income is not identical with cash flow), further complications arise (Davis, 2010:4). Accordingly, I avoid the notion of a "pre-tax" discount rate.

- y is the gross rental **yield**, and is constant during the holding period; that is, if P is the market price at any time and E is the gross market rent at the same time, then

$$E = yP, \tag{7}$$

where y is constant during the holding period. Thus the P/E ratio is $1/y$ and is likewise constant during the holding period.

From Eqs. (5) and (7) we have

$$P = E_0 e^{gt}/y, \tag{8}$$

showing that the rental growth rate g is also the price growth rate. The initial price (at $t = 0$) is

$$P_0 = E_0/y. \tag{9}$$

The assumption of **equilibrium** is embodied in the assumptions that s, r, h, u, v, g, i and y are constant through the holding period. Of these constants, g (hence v) and i (hence u as applied to interest) depend on whether values are **real** (adjusted for inflation) or **nominal** (not adjusted). In principle we can define inflation-sensitive constants in nominal terms or real terms, as long as we are consistent. But reality may cause one convention to be more convenient than the other. In particular, if the tax system assesses nominal interest and nominal capital gains (as in Australia), it is convenient to define all constants in *nominal* terms.

4. General analysis

Let the property be bought at $t = 0$ and sold at $t = T$. Let P_0^{rent} denote the PV of the rent received during the holding period, and let P_0^{resale} denote the PV of the resale price, where both the rent and the resale price are net of taxes and other costs (but not interest, which is accounted for in the discount rate). For the initial buyer, the NPV is the sum of P_0^{rent} and P_0^{resale}, and depends on the anticipated holding period T (which may be different for different buyers).

Before income tax, the rent net of holding charges is $E - hP$. *After* income tax, the net rent received or saved during an infinitesimal interval dt is

$$u(E - hP)dt, \tag{10}$$

which we multiply by e^{-uit} to obtain its present value. Adding the PVs for all the infinitesimal intervals, we have

$$P_0^{rent} = \int_0^T u(E - hP)\, e^{-uit}\, dt. \tag{11}$$

Substituting from Eqs. (5) and (8), we find

$$P_0^{rent} = uE_0(1 - h/y) \int_0^T e^{(g-ui)t}\, dt \tag{12}$$

$$= \frac{E_0(1 - h/y)}{i - g/u}\left[1 - e^{(g-ui)T}\right] \tag{13}$$

provided that

$$g - ui \neq 0. \tag{14}$$

The acquisition price including duty is $P_0(1+s)$, which, by Eq. (9), can be written

$$E_0(1+s)/y. \tag{15}$$

The resale price [from Eq. (8)] is $E_0\, e^{gT}/y$. Resale costs reduce this to $E_0(1-r)e^{gT}/y$. Deducting the acquisition cost (15), then multiplying by v, we obtain the after-tax capital gain

$$\frac{vE_0}{y}[(1-r)e^{gT} - (1+s)].$$

We add this to the cost base (15) to find the after-tax resale price, which is then discounted to find its present value, denoted by P_0^{resale}. The result is

$$P_0^{resale} = \frac{E_0}{y}[(1-r)ve^{gT} + (1+s)(1-v)]e^{-uiT}. \tag{16}$$

Of course we obtain the same result if we subtract the capital-gains tax from the resale price (net of resale costs) and discount the difference.

If the price of acquisition (15) is the NPV, we have

$$E_0(1+s)/y = P_0^{rent} + P_0^{resale}. \tag{17}$$

The use of the price *including duty* on the left-hand side does not amount to an assumption that the price is simply reduced by the value of the duty. Rather, when we substitute from Eqs. (13) and (16), the yield y appears on both sides of the equation, which is solved in order to discover the effects of the various parameters on y, hence on the price. Making those substitutions and solving for y, we obtain the **general formula**

$$y = h + \frac{i - g/u}{1 - e^{(g-ui)T}}\{(1+s)[1-(1-v)e^{-uiT}] - (1-r)ve^{(g-ui)T}\} \tag{18}$$

provided that $g - ui \neq 0$ [Eq. (14)].

If, on the contrary, $g - ui = 0$, then the integrand in Eq. (12) is 1, so that Eq. (13) is replaced by

$$P_0^{rent} = uE_0T(1 - h/y), \tag{19}$$

with the result that Eq. (18) is replaced by

$$y = h + \frac{1}{uT}\{(1+s)[1-(1-v)e^{-uiT}] - (1-r)v\}. \tag{20}$$

Failure to make these replacements when $g - ui = 0$ would cause a "zero over zero" error in Eqs. (13) and (18).

5. Special cases

5.1 Short holding time (revisited)

Eq. (18) can be rearranged as

$$(y-h)e^{uiT} = \frac{i-g/u}{1-e^{(g-ui)T}}\{(1+s)[e^{uiT}-1+v]-(1-r)ve^{gT}\}. \qquad (21)$$

If T is sufficiently short, we can apply the first-order approximation $e^x \approx 1+x$ (for small x), obtaining

$$(y-h)(1+uiT) \approx \frac{1}{uT}\{(1+s)[uiT+v]-(1-r)v(1+gT)\}. \qquad (22)$$

Multiplying both sides by uT, then neglecting quadratic terms in T (which means neglecting the term uiT on the left side),[7] regrouping terms, and solving for y, we obtain Eq. (4) again.

5.2 Perpetual holding

If

$$g < ui \qquad (23)$$

and $T \to \infty$, the exponentials in the general formula [Eq. (18)] approach zero, so that

$$y \approx h + (1+s)(i-g/u). \qquad (24)$$

The condition of convergence [Eq. (23)] implies that the factor $(i-g/u)$ is positive. So the effect of the stamp duty rate s is (again) to increase y and therefore to *reduce* the P/E ratio.

If we neglect the transaction cost s, Eq. (24) reduces to

$$y \approx h + i - g/u, \qquad (25)$$

again confirming that h and i are approximately additive, and agreeing with Eq. (2) if $v = 1$ (i.e. if there is no capital-gains tax, because there is no resale).

If the grossed-up discount rate i is assumed to be exogenous, Eq. (25) indicates that in a rising market (positive g), higher taxation of current income (lower u) gives lower yields, hence a higher risk of financial instability. If, on the contrary, the after-tax discount rate ui is assumed to be exogenous, the situation is less clear, because lower u means higher i.

5.3 No transaction costs

If s and r are negligible, the general formula [Eq. (18)] reduces to

$$y \approx h + \frac{i-\frac{g}{u}}{1-e^{(g-ui)T}}\{1-(1-v)e^{-uiT}-ve^{(g-ui)T}\}. \qquad (26)$$

If $g < ui$ and $T \to \infty$, this reduces to Eq. (25), as it should. If, on the contrary, T is short, we can apply the approximation $e^x \approx 1+x$ to Eq. (26), obtaining

[7] Strictly speaking, the denominator uT on the right side is only a *zero*-order approximation, due to cancellation of the constant term in the corresponding denominator of the previous equation.

$$y \approx h + \frac{1}{uT}\{uiT - vgT\}, \qquad (27)$$

which simplifies to Eq. (2), as it should.

In reducing the general formula to Eq. (26), we have assumed that there are no transaction costs except capital-gains tax. If there is also no capital-gains tax, we can put $v = 1$ in Eq. (26), with the result that all references to T cancel out and we are left with Eq. (25). This is to be expected because, if there were no transaction costs of any kind (not even capital-gains tax), a succession of purchase-resale cycles would seamlessly add up to a perpetual holding, so that the case of a general value of T would agree with the case of the property held in perpetuity.

The independent explanations of some special cases, together with the confirmation of expected relationships between special cases, give cause for confidence in the analysis.

6. Numerical examples

In Table 1, the yield y is computed from the general formula [Eq. (18)]. The top row (beginning with a stamp duty rate of 2%) is the **"base case"**. Subsequent rows show only those figures that differ from the base case. The diagonal line of figures indicates that each of the input parameters in turn is varied from the base case (except that I refrain from varying u, to avoid any assumption as to whether the "exogenous" discount rate is the grossed-up rate i, or the after-tax rate ui, or something in between). The units shown are abbreviated: $h, g, i,$ and y are in %/year, while T and P/E are in years. The last column, $(i + h)/y$, is the ratio of the annual cost of buying to the annual cost of renting, where the "annual cost of buying" excludes principal repayment (the benefit of which is not available to renters). The numbers should be taken as illustrative only.

In the base case, income is taxed at 30% and capital gains at 15%, and the holding charge is 1% per annum. The assumed appreciation rate is 5% per annum, which is modest by (e.g.) Australian standards. Yet the calculated P/E is unrealistically high, even by Australian standards.

If the stamp duty or the resale cost is increased, P/E falls, as is also predicted (albeit for short holding periods) by Eq. (4). If the holding charge h is increased by 1%/year, the fall in P/E is about as large as if the discount rate i is increased by 1%/year; this is to be expected if h and i are approximately additive, as predicted by Eqs. (2), (4), and (25). Increasing the appreciation rate g by 1%/year causes a larger increase in P/E than increasing the holding period to 99 years. Raising the tax on capital gains to match that on current income causes a fall in P/E.

Table 1: Numerical examples computed from the general formula. The first row is the base case. Subsequent rows show figures departing from the base case.

s	r	h	u	v	g	i	T	y	P/E	$(i+h)/y$
2%	2%	1%	70%	85%	5%	8%	10	3.18%	31.45	2.83
3%	.	.	.	.	.	.	.	3.31%	30.17	2.72
.	3%	.	.	.	.	.	.	3.30%	30.32	2.73
.	.	2%	.	.	.	.	.	4.18%	23.92	2.39
.	.	.	.	70%	.	.	.	3.93%	25.44	2.29
.	.	.	.	.	6%	.	.	1.92%	52.12	4.69
.	.	.	.	.	.	9%	.	4.15%	24.07	2.41
.	.	.	.	.	.	.	99	2.07%	48.29	4.35
.	.	.	.	100%	.	.	.	2.43%	41.17	3.71
3%	.	.	.	100%	.	.	.	2.58%	38.82	3.49

Eliminating tax on capital gains (setting $v = 100\%$) causes a rise in P/E. From that point, P/E falls if we increase stamp duty (as in the last line of the table).

In all cases, the last column indicates that buying is considerably more expensive than renting. However, *the affordability of buying is improved by equalizing the tax rates on capital gains and current income, instead of giving concessional rates for capital gains*.

7. Effect of stamp duty

Davidoff & Leigh (2013) have performed a statistical analysis of transaction records to determine the effects of conveyancing stamp duty on housing turnover and "house prices" (that is, prices of house-land packages) in Australia. Concerning prices, they conclude (p. 406):

> Across all postcodes, the short-term impact of a 10 per cent increase in the stamp duty is to lower house prices by 3 per cent...
>
> Because stamp duty averages only 2–4 per cent of the value of the property, these results imply that the economic incidence of the tax is entirely on the seller... Indeed, the house price results are in some sense 'too large', in that they imply a larger reduction in sale prices than the value of the tax (US studies by Ihlanfeldt & Shaughnessy, 2004 and Kopczuk & Munroe, 2012 reach the same conclusion).

According to conventional partial-equilibrium analysis, with an upward-sloping supply curve and a downward-sloping demand curve, a tax imposed between the buyer and the seller reduces the net price received by the seller, but reduces it by *less* than the value of the tax. If we modify the analysis to show how a fixed stock of similar properties will be distributed between current owners and newcomers (Wood et al., 2012:6–7), we again conclude that a stamp duty on the purchaser reduces the price by less than the value of the tax. That is the sense in which the price reductions observed by Davidoff & Leigh are "too large".

The conventional analysis is applied to the purchase or the resale of a property, but not both. If we instead consider the purchase-resale cycle as a whole – as in the present paper – the results of Davidoff & Leigh are easily explained. Any stamp duty on the initial purchase is a deduction from the total interest that a rational investor will pay or forgo during the holding period. It therefore reduces the price that the investor will pay. As the price can be larger than the interest bill during the holding period, the reduction in the price can be larger than the reduction in the interest bill – that is, larger than the stamp-duty bill.

This reasoning is confirmed by Table 1 if we divide s by y to express the stamp-duty bill in years' rent (just as P/E expresses the price in years' rent). Comparing the top two lines, we find that the stamp duty increases by 0.28 years' rent while the price falls by 1.28 years' rent. Comparing the bottom two lines, we find that the stamp duty increases by 0.34 years' rent while the price falls by 2.35 years' rent. In each case, the fall in the price is several times larger than the increase in the duty. Hence, if the duty were offset by a subsidy for home buyers (equivalent to a negative stamp duty), the price would *rise* by more than the value of the subsidy.

8. Stabilizing the market

While we may not know the maximum sustainable P/E ratio, we do know that an infinite price is unsustainable. Hence a reasonable method of assessing the margin of financial stability is to check how far the appreciation rate must rise, or the discount rate must fall, in order to produce a zero yield, i.e. an infinite NPV.

In the base case, the appreciation rate g is 5%/year and the (grossed-up) discount rate i is 8%/year. Using Eq. (18), we find that if the appreciation rate rises to slightly under 7.6%/year or the discount rate falls to slightly over 4.7%/year, the yield y falls to zero. If we repeat the exercise with $v = 100\%$, we find that the yield falls to zero if g rises to about 6.7%/year or i falls to just over 5.5%/year. This example confirms that eliminating capital-gains tax makes it easier to produce infinite NPVs.

If the financial system tries to support unsustainable NPVs, there will be a sub-intrinsic-value bubble. One could try to avoid the bubble by imposing regulatory limits on lending. This policy does not try to restore market efficiency, but tries to change the mechanism by which prices fall short of NPVs – from loans that cannot be repaid, to loans that cannot be made. Because the policy is inevitably less than surgical, it "succeeds" only if some prospective buyers find that their borrowing opportunities are limited by the regulations rather than by their capacity to service loans. In other words, it succeeds only if some people who are financially capable of becoming home owners are "locked out" by the regulations. The experience of the last decade suggests that under those circumstances, the regulations will be either repealed or breached, until the market, having been liberated from the "dead hand" of regulation, collapses under the dead weight of unserviceable debt.

Given a model predicting the effects of taxes on NPVs, there is an alternative remedy which *does* restore market efficiency, namely to reform the tax system so that NPVs are brought within the borrowing capacity of prospective buyers.

From the base case, let us change s to 0 (no stamp duty) and v to 55% (45% tax on capital gains). Then P/E falls to a more sustainable 22.4 years, and $(i+h)/y$ (the ratio of the annual cost of buying to the annual cost of renting) falls to 2.02 (lower than any example in Table 1). To reach an infinite NPV from this new starting point, g must rise to almost 10%/year or i must fall to just over 3%/year. So this tax regime not only makes home ownership more affordable but also makes financial stability more robust in the face of changing parameters.

From the base case again, let us change s to 0 (again) and v to 100% (no tax on capital gains), and raise the holding charge h to 3.33%/year. Then P/E falls to 22.4 years (again), indicating that the tax system raises the same revenue (in discounted terms) over the purchase-resale cycle as in the previous example. But $(i+h)/y$ falls only to 2.54, indicating that the annualized cost of buying is higher than in the previous example. This is to be expected because the tax is payable continuously through the holding period, not as a lump-sum on resale. Financial stability, although more robust than in the base case, is less robust than in the previous example: the calculated P/E becomes infinite if g rises to about 8.2%/year or i falls to about 3.5%/year. So in this example, a capital-gains tax does more for housing affordability and financial stability than a holding charge (e.g. a land tax) raising comparable revenue.

Stamp duty, like capital gains tax, is a deduction from the interest that a rational investor will pay during the holding period; but, unlike capital gains tax or interest, it is not roughly proportional to the holding time. Hence, while both stamp duty and capital-gains tax depress prices, the impact of stamp duty is more sensitive to the holding period T. For example, if we modify the base case so that there are no transaction costs of any kind (stamp duty, resale costs, or capital-gains tax), the predicted P/E ratio is an absurdly high 53.85, regardless of T. If T is 4 years, a 45% capital-gains tax or an 8% stamp duty reduces P/E to about 21.1. Under the capital-gains tax, halving T reduces P/E only slightly further, to 20.4; but under the stamp duty, halving T reduces P/E to 13.1. So, for the purpose of stabilizing the market, capital-gains tax is preferable in that its effect is less sensitive to the intended holding period.

9. Effects omitted from the model

The above comparison between a capital-gains tax and a holding charge assumes that the latter is "payable continuously through the holding period." If payment of the holding charge were instead deferred until the next sale of the property, the charge would resemble a capital-gains tax in the timing of the payment, and in the amount paid (because both the cumulative holding charge and the capital gain would increase with *T*).

The discount rate (or some measure of it) and the appreciation rate are treated as exogenous in this paper, although in practice they must be influenced to some extent by tax policy. Most obviously, any mismatch between tax rates and spending commitments may influence the government borrowing requirement, which in turn will have some influence (among other influences) on expected interest rates, hence discount rates. Less obviously, if a government, by means of a land tax or a capital-gains tax, stands to gain revenue from uplifts in property values, it has an incentive to invest in infrastructure projects that cause such uplifts in the serviced locations. If the tax base is reformed so that the government receives a

larger share of such uplifts, a wider range of projects will pay for themselves by expanding the tax base (with no further increase in tax rates), so that more projects will proceed per unit time, and g will be greater.

The rental value of a property is also treated as exogenous, although it must be influenced to some extent by tax policy. For example:

> (a) Stamp duty, unlike land tax, impedes transfers of title. In particular, stamp duty impedes transfers that are needed for construction of new accommodation. This mechanism tends to reduce the supply of accommodation, making rents less affordable (that is, raising rents relative to amenity and tenants' spending power). Capital-gains tax is open to the same criticism, but not to the same degree, because (i) under a stamp duty, the transfer of title *creates* a tax liability, whereas under a capital-gains tax it merely *realizes* an already accumulated liability, and (ii) a capital-gains tax, unlike a stamp duty on the purchase price, will not turn a capital gain into a capital loss or increase a capital loss.
>
> (b) Proponents of land tax argue that a holding charge on the land presses the owner to generate income from it, in order to cover the holding cost, and therefore encourages construction, raising the supply of accommodation and making rents more affordable. (If, however, the holding charge is levied not on the land value alone, but on the combined value of the land and artificial structures, the incentive to build will be reduced.) A capital gains tax, by reducing the attractiveness of capital gains relative to current income, also encourages land owners to generate income from their land; but because the tax is not a holding cost, the need to generate income is less urgent than in the case of a land tax.

While the numerical examples tend to favour capital-gains tax over land tax, the above points, which are not so easily quantified, tend the other way.

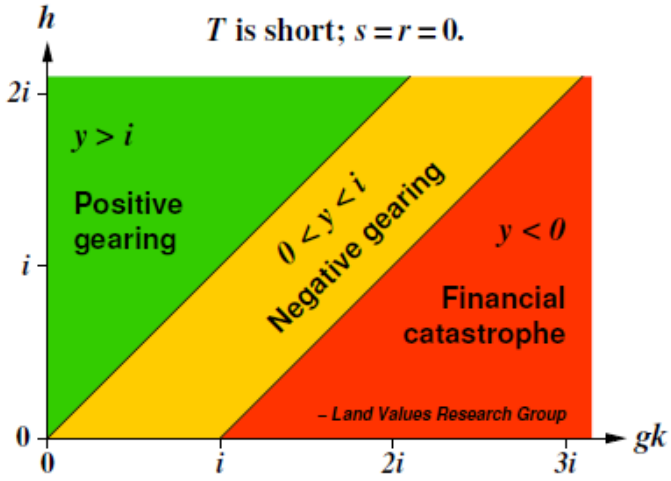

Fig. 1: Financial stability contour map for short holding times, and no transaction costs except capital-gains tax. The "map" is a graph of the equilibrium rental yield y as a function of the holding tax rate h (vertical axis) and the gk product (horizontal axis), where g is the appreciation rate and k is the effective capital-gain magnification due to income tax.

If tax parameters influence market parameters (other than y), we cannot arbitrarily change the former while assuming that the latter stay the same. This observation does not invalidate the general formula, but does affect the values that should be substituted into it.

10. Financial stability contour map

Using a two-dimensional contour map, we can graph the calculated yield y as a function of any two parameters (or combinations of parameters) while other parameters are held constant. Two interesting contours are $y = i$ and $y = 0$. These delineate three regions in which (respectively) $y > i$, $0 < y < i$, and $y < 0$. The last region can be labeled "financial catastrophe" without implying that it can ever be reached; in practice, financial crises begin when the actual rental yield is still positive, albeit low. The region $0 < y < i$ can be labeled "negative gearing" after the Australian term for a cash-flow-negative investment (as if the entire purchase price is borrowed at the interest rate i, which exceeds the yield). Obviously a "negatively geared" investor relies on capital gains and/or rising rents. The region $y > i$ can then be labeled "positive gearing" (if we ignore holding costs other than interest).

One example may suffice for illustration. If T is short and there are no transaction costs except capital-gains tax, we can apply Eq. (2), which can be written

$$y \approx h + i - gk, \tag{28}$$

where $k = v/u$ is the factor by which the tax system magnifies capital gains relative to current income. Eq. (28) can be understood as expressing y as a function of h and gk. To graph the function, we can calibrate the axes in terms of i. Because the "function" is linear, the contour map will be that of a sloping plane, so that the contours will be uniformly spaced, parallel lines.

To find the contours, we solve for gk, obtaining

$$gk = h + i - y. \tag{29}$$

A single contour is a graph of gk vs. h for constant y. This graph is a straight line with unit slope and an intercept of $i - y$ on the gk axis. For the contour $= 0$, the intercept is i; and for the contour $y = i$, the intercept is 0. The result is shown in Fig. 1, from which we can easily see that stability is improved as we move up or to the left – that is, as we increase the holding charge or reduce the effective capital-gain magnification (that is, raise the capital-gains tax).

11. Conclusions

There are combinations of tax rates, appreciation rates, and discount rates under which net present values (NPVs) of properties will exceed buyers' capacity to service loans. If the financial system tries to support such high prices, borrowers will be overextended, causing a financial crisis, which will be said to have been unforeseeable because prices remained below NPVs.

The sovereign remedy for this sort of financial instability is to change the tax settings so as to bring NPVs within buyers' capacity to service loans, allowing the market to be efficient. This can be done by raising recurrent property taxes (preferably levied on land values alone) or capital-gains taxes. In the absence of deferrals of recurrent property taxes, the capital-gains-tax option does more to reduce the annual cost of ownership relative to renting.

A general consumption tax, whatever its rate may be, does not affect P/E ratios in so far as it merely devalues the currency in which prices and rents are measured. Nor does this paper assume anything about the tax on *labor* income. Both of these taxes can be raised or lowered without affecting the parameters of this paper. Thus the "sovereign remedy" has no implications concerning the overall level of taxation or public expenditure.

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