Economics Letters 109 (2010) 54–56

Contents lists available at ScienceDirect

Economics Letters

journal homepage: www.elsevier.com/locate/ecolet

Betterment taxes, capital gains and benefit cost ratios

Andrew Coleman [a,b], Arthur Grimes [a,c,*]

[a] Motu Economic and Public Policy Research, New Zealand
[b] University of Otago, New Zealand
[c] University of Waikato, New Zealand

ARTICLE INFO

Article history:
Received 8 October 2009
Received in revised form 13 August 2010
Accepted 20 August 2010
Available online 22 September 2010

JEL classification:
H21
H22
R51

Keywords:
Betterment tax
Land tax
Capital gains tax

ABSTRACT

'Betterment' taxes can be used to fund infrastructure investments. We relate betterment taxes to the benefit: cost ratio, deriving conditions under which a project can be funded by such taxes, and relate betterment taxes also to a capital gains tax.

1. Introduction

The funding mechanism for local infrastructure and amenity investments can be influential in determining (a) whether a project is undertaken, and (b) the incidence of the project costs. This note examines the circumstances in which 'betterment' taxes can fully fund such investments. We relate the use of two types of betterment tax to the project's benefit: cost ratio (BCR) and derive conditions under which a project can be fully funded by such taxes. We also demonstrate how a betterment tax is related to a capital gains tax.

We define a betterment tax as one that taxes land value on an ongoing basis in order to capture the uplift in land values that may occur following a public infrastructure investment. With a betterment tax, a government body funds the investment through debt that is subsequently serviced and repaid through the betterment tax revenues. Some economies raise a material proportion of tax revenues by way of land and/or property taxes (Dye and England, 2009; Franzsen, 2009). Some have specifically employed betterment taxes; for instance, New Zealand local authorities had the legal ability to impose a 50 percent betterment tax between 1926 and 1953 (Harris, 2005).

Mill (1865, Book 5, Chapter 2, §5) advocated a land tax levied on the increment to land values above those at a fixed point in time. He argued that that the increment in land values was due to general societal influences and this increment should form the basis for government revenues required for the upkeep of society. Modern spatial economics analyses of the impacts of new infrastructure investments on land values embody a related analytical approach (Roback, 1982). The observation that land values impound the value of location-specific factors (Ricardo, 1817) implies that a new infrastructure or amenity investment that is valued locally will be reflected in a step change in local land prices. In this situation, a tax applied to local land values, and especially to changes in those values consequent on an infrastructure investment, may be considered as a method for funding that investment.

2. Taxation of betterment

Local landowners experience a real capital gain when a specific infrastructure investment raises local land values. A related situation occurs where land is rezoned, for instance from agricultural to residential use (Grimes and Liang, 2009). The rise in land values through betterment can be captured by the infrastructure investor if that investor owns the land serviced by the new investment. Otherwise (in the absence of taxation or development levies) it accrues to private landowners who may not have funded the investment. In this latter situation, at least some portion of betterment can be captured by government if the rise in land values is taxed.

For analytical purposes, we concentrate here solely on the taxation of *real* capital gains due to betterment (i.e. nominal gains due to generalised inflation are exempt). We consider two alternatives. First,

* Corresponding author. PO Box 24390 Wellington 6142, New Zealand. Tel.: +64 49394250; fax: +64 49394251.
E-mail address: arthur.grimes@motu.org.nz (A. Grimes).

0165-1765/$ – see front matter © 2010 Elsevier B.V. All rights reserved.
doi:10.1016/j.econlet.2010.08.012

we consider the effectiveness of a general real land tax in taxing betterment values. Second, we consider the effectiveness of an incremental real land tax for the same purpose, reflecting Mill's proposed tax. We relate this latter form to a direct capital gains tax.

As a general case, consider the purchase price of a plot of land at the end of year i = 0 that is expected to pay the owner an annual after-income-tax rental stream of $Y_i = Y$ in years i = 1,…,∞. Rents may reflect the imputed value of the property to the owner–occupier, or may be the explicit contractual amount paid by a tenant to a landlord. Let 'r' be the real interest rate, 't' the land tax rate, and 'k' other net costs or benefits associated with the land (expressed as a ratio of the land value); r, and k are treated as known, fixed rates. When the tax rate is *t*, the value of the property at the end of year *i* is denoted V_i^t.

Extending the analysis of Oates and Schwab (2009), the purchase price of the property at the end of year 0 is given by the discounted value of future rents less tax and other payments:

$$V_0^t = \sum_{i=1}^{\infty} \frac{Y}{(1+r)^i} - \sum_{i=1}^{\infty} \frac{kV_0^t}{(1+r)^i} - \sum_{i=1}^{\infty} \frac{tV_0^t}{(1+r)^i} \tag{1}$$

From the solution of a discounted infinite sum:

$$V_0^t = \frac{Y}{r} - \frac{kV_0^t}{r} - \frac{tV_0^t}{r} \tag{2}$$

Equating terms and solving for V_0^t gives the purchase price:

$$V_0^t = \frac{Y}{r+k+t} \tag{3}$$

For the first betterment tax alternative, assume that initially no land tax is in place. The initial value of the plot is therefore: $V_0^0 = Y/(r+k)$. A public infrastructure project is then built that raises the annual real rental stream to Y* and an annual land tax at rate t is levied; the new plot value becomes: $V_0^* = Y^*/(r+k+t)$. If the tax rate were set to capture all value uplift from the project (so that $V_0^* = V_0^0$), it would be given by:

$$t = \frac{(r+k)(Y^*-Y)}{Y} \tag{4}$$

For example, if r = 0.05, k = 0.00, and $(Y^*-Y)/Y = 0.1$, the required tax rate is t = 0.005.

The present discounted value of the tax flow equals tV_0^*/r. One policy aim may be to set this value equal to the per property project cost, P. The resulting tax rate becomes:

$$t = \frac{r(r+k)}{Y^*-rP} \tag{5}$$

To interpret Eq. (5), note that rP is the per property interest servicing cost of the project. Consider a project with P = $10,000, r = 0.05, k = 0.00 and let Y* = $11,000 (= 1.1 × Y, where Y = $10,000); hence rP = $500 and the BCR, defined as $(Y^*-Y)/rP$, equals 2. The resulting $t \approx 0.0024$. If, instead, P = $20,000 (hence BCR = 1), the required t = 0.005, consistent with the full value uplift case. Generalising, the project can be financed through a flat land tax and still leave some value uplift for local landowners provided BCR > 1; if BCR < 1, full financing through a flat land tax will lead to a decline in property values.

Now consider the second alternative in which only real incremental land value is taxed (at rate t). The value of a plot of land that experiences an unexpected rise in land rents from Y to Y* due to a new infrastructure investment becomes:

$$V_0^* = \frac{Y}{r+k} + \frac{Y^*-Y}{r+k+t} \tag{6}$$

The first term on the right hand side of Eq. (6) is the land value prior to the rise in rents which remains unaffected by the incremental land tax. The second term reflects the rise in land value consequent on the project; the tax is levied on this increment. Thus the present discounted value of tax revenue is given by $[t(Y^*-Y)]/[r(r+k+t)]$. The tax rate required to finance a project with per property cost, P, becomes:

$$t = \frac{r+k}{[(Y^*-Y)/rP]-1} \tag{7}$$

Eq. (7) establishes that an incremental (real) land tax can fully finance a project if and only if the BCR > 1. Even then the tax rate may be 'high.' For instance, if we assume the same values for r, k, Y and Y* as before but with P = $19,000 (BCR ≈ 1.053), the result is t = 0.95. A tax rate of less than unity requires BCR > 1 + r + k. If the BCR is favourable, a more moderate incremental land tax rate can result; for instance, with P = $5000 (BCR = 4), $t \approx 0.017$. Realistically, therefore, full financing of a project through an incremental (real) land tax may be restricted to projects with high BCRs.

A real incremental land tax can be conceived as a replacement for a tax on real capital gains on land. The latter option taxes the one-off annual capital gain at rate c; by contrast, an incremental land tax spreads the tax over time. We can equate the present discounted revenue from an incremental land tax with the revenue from a capital gains tax, as follows:

$$t = \frac{(r+k)c}{(1-c)} \tag{8}$$

For instance (with r = 0.05 and k = 0.00), instead of a capital gains tax of 30%, an incremental land tax could be substituted with a rate of 2.14% p.a. Each approach would result in 30% of the real capital gain being taxed (in present discounted value terms), with the same present discounted revenues accruing to government. Cash-flows from an incremental land value tax would differ from a capital gains tax since the former would be spread over the indefinite future whereas a 'pure' capital gains tax is due immediately (within one year) of the capital gain being apparent. In many jurisdictions, cash-flow concerns with regard to the taxpayer means that the capital gain is only payable on realisation of the property, which creates lock-in effects and other complications. These issues are much less problematic in the case of an incremental land tax.

3. Conclusions

Provided that independent land valuations are performed on all properties, a betterment tax can be levied to fund public infrastructure and amenity investments under certain circumstances. A flat rate land tax is one possibility, but that option taxes pre-investment land values unrelated to the specific investment. An alternative is an incremental land tax that taxes only the uplift in values due to the new infrastructure or amenity. The full project cost can be recovered by the latter tax with a tax rate of less than 100% if the project's BCR > 1 + r + k where r is the cost of capital and k is other costs associated with ownership of the land (expressed as an annual rate).

Provided this latter condition is met, the project can be fully financed from the incremental betterment tax while leaving some value uplift available for local landowners. If a land tax is already in existence, addition of a special betterment tax has virtually no additional administrative cost; in addition, the ability to avoid (or evade) the tax is virtually non-existent since the land is valued by an independent agency and is available as collateral in cases of non-payment of tax. Furthermore, use of a land tax has favourable efficiency properties relative to other taxation or funding options. A capital gains tax is another option and we demonstrate the

equivalence of the two taxes in terms of raising revenues. One advantage of the land tax over a capital gains tax for the landowner is that cash outflows are spread over time unlike a capital gains tax that may cause cash-flow problems since the latter involves a lump-sum tax payment.

Acknowledgement

The authors thank the New Zealand Treasury and Foundation for Research, Science and Technology (programme MOTU0601 Infrastructure) for the funding. The views expressed are solely those of the authors.

References

Dye, R., England, R., 2009. Land Value Taxation: Theory, Evidence and Practice. Lincoln Institute of Land Policy, Cambridge, Mass.
Franzsen, R., 2009. International experience. In: Dye, R., England, R. (Eds.), pp. 28–47. op. cit.
Grimes, A., Liang, Y., 2009. Spatial determinants of land prices: does Auckland's metropolitan urban limit have an effect? Applied Spatial Analysis and Policy 2, 23–45.
Harris, C., 2005. Slow train coming: the New Zealand State changes its mind about Auckland Transit, 1949–56. Urban Policy and Research 23, 37–55.
Mill, J.S., 1865. Principles of Political Economy with Some of Their Applications to Social Philosophy. Longmans, Green, & Co., London.
Oates, W., Schwab, R., 2009. The Simple Analytics of Land Value Taxation. In: Dye, R., England, R. (Eds.), pp. 51–72. op. cit.
Ricardo, D., 1817. On the Principles of Political Economy and Taxation. John Murray, London.
Roback, J., 1982. Wages, rents and the quality of life. Journal of Political Economy 90, 1257–1278.