Introduction

When does the long run begin? As we will see, periods following a first period are considered part of the long run. Capital gains (measure of asset value increases), dividends (accruing to individual owners), interest income, and corporate profit, are forms of capital income. Returns to owning company shares include value changes and dividends. Note, capital gains (positive or negative) may be realised or unrealised - making optimal taxation uncertain.

Taxes are compulsory or involuntary payments, without explicit quid pro quo. They are also a government's main source of fund, accounting for most non-borrowed revenue. Whilst direct taxation of capital gains is linked to income tax, they are considered separately. Capital income taxation is a major source of government revenue. In defining capital taxation's format, we should highlight the arbitrary treatment for nature and holder of assets. Whilst the arbitrary nature of capital taxation isn't atypical, the determination of taxes paid on holding shares rests on whether the consumer receives returns in through capital gains or dividends. Also, concerning efficiency considerations, note the tax status of assets could be of greater importance than an asset's expected performance - suggesting zero taxation will lead to greater investment, which contributes to greater economic growth.

Of course, it is said capital income is taxed too heavily. But, is there evidence of high capital income tax rates being optimal? Seminal work on optimal tax code choice dates back to Ramsey (1927), where optimal levels of excise tax on consumption were characterised. The idea of maximising society welfare, subject to budget and other constraints, is the optimal taxation problem - often called the *Ramsey Problem*. Ramsey assumed the setting of taxes to be subject to constraints. Firstly, certain revenue should be raised. Secondly, whatever the tax system, an economy's agents react in their own interest (through assumed competitive markets) - therefore, policy should account for equilibrium reactions by firms/consumers.

When considering tax policy format, economists are supposed to minimise potential distortionary effects. Now, much research suggests capital income taxation should be removed to eliminate such distortion. This is considered a standard view - contradicting conventional views that capital income should be taxed heavily. Lucas (1990) agrees: "*I now believe that neither capital gains nor any income from capital should be taxed at all* ". In addressing how capital income should be taxed within efficient systems, Lucas (1990) shows the long run, steady state, optimal rate of capital taxation is zero. He uses models with an infinitely lived consumer (having capital and labour wage income), and fixed government spending (financed through proportional income taxes). Lucas (1990) calibrates his model's steady state to the US economy, estimating immediate gains of consumption equivalent to around 1.25 per cent GDP, by implementing the policy. The following explains why long run optimal capital level of taxation's considered zero and whether the results supported by Lucas (1990) are realistic.

Why should or would long run optimal capital income taxation be *roughly* zero?

A reason for zero capital income tax being optimal might be that, where there's an absence of information exchange and capital income taxation occurs in the country where the capital lies, there's tax competition and governments with no capital income tax attract foreign investment positively affecting an economy's aggregate demand. Still, past views suggest capital income taxation is desirable. But, in such models, saving is a fixed fraction of income. Recent models, leading to a zero optimal result, assume saving's a non-fixed fraction, as individuals maximise utility from consumption. If the objective of saving (or capital accumulation or investment) is greater future consumption, then capital income taxation at constant rate makes the objective more difficult and also becomes an ever-increasing consumption tax. Thus, reasons for zero capital income tax concern the fact that it optimises consumption and minimises distortion.

For those rich agents accruing large amounts of capital income, initially it might seem there would be little problem in taxing them. However, such taxation would affect not only those people. It results in negative repercussions for the entire economy. For, if there's saving discouragement, there will be fewer funds for investment use. This implies less economic growth, affecting the entire economy. Thus, it can be considered unfair to depress the economy and all agents within it, through misjudged capital income tax policy. Therefore, it can be argued the best way to tax an economy's wealthiest is via consumption and not investment - because, whilst minimising distortion, you may maximise fairness.

The theory of optimal fiscal policy, where capital income taxation equals zero, is based around standard dynamic general equilibrium models - with broad assumptions concerning preferences and technology. The idea that optimal long run capital income tax is zero was shown by Chamley (1986), using simple exogenous growth models (though, it's also been shown to hold for steady state and endogenous growth), in the context of a deterministic infinitely lived agent economy. Heterogeneity was introduced into similar frameworks by Judd (1985), where primary issues involved redistribution. In deed, Judd (1985) also concluded optimal capital income tax to be zero, with certain assumptions. This is why the often-titled Chamley-Judd result is considered consistent and robust. As we shall see, many other studies have extended this result to other environments.

Chamley's (1986) basic result is that, in long run steady state, optimal capital income tax rate is zero. In practice, we should interpret this as implying capital income tax should be forced to zero. As, even if it were optimal to have zero capital income tax, it would take time to implement. Atkeson, Chari and Kehoe (1999) suggest an extended version of Chamley's model, suggesting it would be optimal to have an initial phase of positive capital income tax (perhaps, to allow governments to build a surplus for use when capital income tax equals zero).

This phase may correspond to an implementation lag, suggesting the process of removing capital income taxation - to achieve the Chamley result - should start immediately.

The claim (that zero capital income tax is optimal in the long run) derives from the standard Ramsey infinite horizon model - where it's required that after-tax real interest rate equals exogenous consumer rate of time preference in equilibrium. A horizontal long run capital supply curve (and an infinitely high long run interest elasticity of supply) is implied by such long run constancy of after tax interest rates. However, is infinitely high savings elasticity possible? As most empirical work suggests interest elasticity of saving is low, it's hard to believe. Therefore, can we believe optimal capital income tax equals zero?

Why might we doubt that the optimal capital income tax is *roughly* equal to zero?
Noting that governments actually implement high rates of capital income taxation (in the US, between 1965-95, the average rate was found to be 35.4%), it would be of interest for us to know why governments may not enforce a zero capital income tax policy. Initial reasons to doubt the zero capital income tax optimal result may be consequential of the fact that it - derived via theory based modelling - relies on certain assumptions. Firstly, whilst generous, available tax sets are assumed incomplete. Secondly, standard modelling concerns situations where tax policy changes affect endogenous variables, such as output, but don't influence consumption expenditure changes - spending is assumed exogenous. Though standard, such assumptions aren't realistic. For instance, government expenditure is endogenous - particular expenditure may depend on tax revenue generated.

Within a model (Auerbach-Kotlikoff) economy, it's been shown that general classes of consumer preference conditions violate conditions supposedly sufficient for a zero capital income tax rate. Thus, it seems, where governments only have access to minimal sets of policy instruments and where all face equal proportional taxes, fiscal policy implies optimal capital

income taxation is non-zero. Still, with a more general class of utility functions and under conditions allowing a government to be unconstrained by finite numbers of instruments, the conditions necessary for an optimal zero capital income tax rate are satisfied. Also, as shown by Escolano (1992), such a result doesn't rely on assumptions regarding relations between government and individual discount factors - as previously suggested.

Many explanations have been given concerning why actual capital income tax is high. The reliance on market incompleteness is one. With complete markets, Chari, Christiano and Kehoe (1994) find optimal policy involves zero expected capital income tax. This is achieved, after a single period's transition characterised by a levy on all capital income and existing capital stock. The levy's announced for the economy's second period and is anticipated by governmental arranging of borrowing to finance initial indebtedness. After the second period, all capital income taxation's abolished to achieve the Chamley (1986) result. However, we may doubt this occurrence, because capital taxation with long run government savings is said to be an unsatisfactory recommendation for governments wanting fiscal policy optimisation. This is because governments have borrowing limitations - preventing them from shifting tax burdens to future generations. Also, historically, such levies have proved unsustainable, without involving moderate capital taxation in the following years (Eichengreen (1990)).

Capital returns taxation may deter excessive capital accumulation, in an environment where there's uninsurable idiosyncratic risk. Keeping this in mind, Aiyagari (1995) finds the optimal rate of capital income tax to be approximately 30%. Thus, where zero optimal capital income taxation doesn't hold, it relates to problems concerning market incompleteness implicit in economies of overlapping generations - with crossover trade (amongst generations not overlapping) restricted to zero (outlined by Samuelson (1958)). Thus, it's suggested, whilst new born generations accumulate assets, aggregate labour income tax burden effects may equal or exceed that of the supposed negative effects of capital income taxation from aggregate

capital stocks. This implies optimal tax policy should involve balancing the two opposite effects. Thus, an optimal capital income tax equalling zero may not be expected.

Using quantitative analyses, Escolano (1992) shows, in overlapping generations economies, positive capital income taxes may be optimal and any efficiency loss, considered a result of fiscal policy, may be quantitatively irrelevant. In that model, for a specific government discount factor, the optimal capital income tax equals zero. However, there are shortcomings. For instance, there aren't sufficient considerations of whether this result is general. Escolano's quantitative exercise also implies governments have use of restricted sets of policy instruments (concerning non-specific proportional taxes). Though, from normative perspectives, there appears no reason to restrict a government's policies.

Another reason for actual capital income tax rates being high, rather than roughly zero, is the reliance on sustainability and time inconsistency of certain fiscal policies. In deed, the greatest perceived barriers to the zero capital income tax result are difficulties in ensuring a government keeps policy promises. For instance, suppose a benevolent government attempts to maximise welfare of both present and future generations, subject to constraints implying necessary satisfaction of present value budget constraints and that the optimal tax policy's associated allocations belong to the competitive equilibrium's subset of policies. In such a situation, the optimal policy may involve time-consistency problems - if a government has incentives to deviate once the policy has been announced and recognised by consumers.

When, in future periods, governments appear unable to commit to a policy, the optimal capital income tax rate may be greater than zero. Where there's complete characterisation of the equilibrium value set of a standard dynamic model, it's said, if the supposed best policy isn't sustainable in a sequential equilibrium, the long run optimal capital income tax won't be zero (Phelan and Stachetti (1999)). In deed, a calibrated version of an economy similar to this, with the Markov perfect time consistency policy, implies optimal capital income tax is close to

the actual high US rate - Klein and Rios-Rull (1999) proved this, where there's partial commitment. Thus, if a government can't commit and follow a pre-specified policy, the implementation of zero optimal capital income taxation could be difficult. This is so, because, within every period, a government has incentives to renege on past policy promises - placing high tax rates on current capital income, whilst promising zero future taxation. Kydland and Prescott (1977) show this and that tensions lead to prominent capital income taxation in every period.

Principally, a government has incentives to levy unanticipated - non-distortionary - taxes on pre-existing wealth. Unless it imposes high capital income tax ex ante, it might be unable to convince individuals (voters) that they can safely save without fearing confiscatory taxation ex post. However, if capital flight's possible, the private sector can escape from ex post capital levies - thus, reducing governmental incentives to impose such levies. It is argued this may strengthen investor confidence and stimulate wealth accumulation, by reducing the time-consistent capital tax a government may credibly impose. However, because models of the time-consistency problem are unrealistically based on two periods, any consistency problem could be considered an exaggeration. This is because, unless a government's short sighted, it will note the importance of securing wealth accumulation beyond tomorrow - and so, if it goes against its announced intentions, it will recognise its economy will suffer from low future savings levels. Thus, through gaining benefits from voter support and such like, a government may have incentives to keep promises, because it then gains or maintains good reputation. Therefore, to allow zero capital income tax outcomes, there¹s the possibility of removing governmental reneging as a stumbling block (Chari and Kehoe (1990)).

Another source of doubt, concerning whether no capital income tax would be optimal in the long run, are real world private market imperfections - as theory, supporting a zero rate, relies on perfect markets. Thus, it could be argued, when imperfections (externalities, for

example) are incorporated, optimal capital income tax won't be zero.

Conclusion

In optimal factor income tax theory, the most prominent feature's considered to be that optimal long run capital income tax should equal zero, minimising distortions. Various authors have examined and advanced Chamley's (1986) result and support this. Research, therefore, suggests, for various environments, long run capital tax isn't a good idea and should be zero. Arguments against this result are often said to be weak. Therefore, many think zero capital tax should be applied to the real world. However, actual capital income tax is far from zero in developed countries. This may be considered understandable, because, not too long ago, policymakers relied on what is now outdated theory - like the idea that saving is a fixed fraction of income - supporting positive capital income tax. Like Lucas (1990) advocating lower capital income taxes, recent policymaker attitudes have shifted somewhat. This may have been seen during the Reagan administration, where capital gains taxes were lowered.

However, the zero optimal long run capital income tax result isn't universally accepted. The source of their argument is the simplicity of the models that derive such a result, in comparison to the real world. They doubt governments can accurately foresee an equilibrium of reactions of all individuals within an economy. After all, can governments precisely determine how all individuals will react? It seems unlikely, considering stochastic elements of an economy. Doubters argue such theory doesn't work, without certain supposedly unrealistic assumptions - specifically governmental ability to be time-consistent and committed to tax policy. Doubters may be right, but may be wrong. As, whilst assumptions are somewhat necessary for capital income tax to be optimal at zero, they aren't definite barriers that will definitely prevent the well-supported theory's practical application.

Zhu (1992) looks to extend the Chamley-Judd result, only to find that it isn't true for stochastic economies. Also, Chari and Kehoe prove that, even with policymakers placing no weight on capitalists and the existence of heterogeneous consumers, zero long run taxation of capital isn't optimal. At the same time, Chari, Christiano, and Kehoe (1994, 1995), affirm that zero expected long run (from the second period onwards) capital income taxation is statistically optimal. Therefore, it's safest to conclude, whilst it is possible that zero is the optimal long run rate, it isn't a certainty. Thus, we can't rule out the possibility that a positive rate might be the optimal. In other words, for general utility functions within stochastic growth models, the optimal long run capital income tax may or may not be zero.

Finally, what is certain is that there is no definitive evidence assuring an optimal zero capital income tax the long run - whether the economy is developed or not. The precise nature of optimal taxation isn't obvious and is a complicated issue. However, different economies face differing conditions influencing their health - thus, realistically, it seems safest to assume, whilst zero capital income tax may be optimal for an economy, it may not be for all.

Also, even if zero long run capital income tax rate's optimal, an area for investigation would be whether zeroing capital income taxation could actually be perfectly achieved. For instance, it may happen through elimination of corporate income tax, capital gains tax, and taxation of dividends and interest. However, this isn't perfect - because there'd be problems dealing with income of the self-employed, consisting of both capital and labour income.