Optimal Capital Taxation Under Stochastic Returns To Savings

Eddy Zanoutene

Université Paris II - Panthéon Assas

November 11, 2021

Structure

1. Motivation
2. The Model
3. Conclusion

Motivation I : Zero capital tax benchmark

Motivation I : Zero capital tax benchmark

- In developed economies, governments usually levy taxes on capital.

Motivation I : Zero capital tax benchmark

- In developed economies, governments usually levy taxes on capital.
- Yet providing a clear theoretical justification for taxing capital can be challenging.

Motivation I : Zero capital tax benchmark

- In developed economies, governments usually levy taxes on capital.
- Yet providing a clear theoretical justification for taxing capital can be challenging.
- In particular using the influential optimal tax framework provided by Atkinson and Stiglitz (1976) one can prove that labor income taxation is sufficient to maximize welfare : **zero capital tax benchmark**.

Motivation II : Stochastic Returns To Savings

Motivation II : Stochastic Returns To Savings

- Standard optimal taxation model : agents access a unique, deterministic, rate of return to savings.

Motivation II : Stochastic Returns To Savings

- Standard optimal taxation model : agents access a unique, deterministic, rate of return to savings.

$\Rightarrow$ convenient assumption

Motivation II : Stochastic Returns To Savings

- Standard optimal taxation model : agents access a unique, deterministic, rate of return to savings.

$\Rightarrow$ convenient assumption

$\Rightarrow$ but recently challenged by :

Motivation II : Stochastic Returns To Savings

- Standard optimal taxation model : agents access a unique, deterministic, rate of return to savings.

$\Rightarrow$ convenient assumption

$\Rightarrow$ but recently challenged by :

- Direct empirical evidence of heterogeneous and volatile returns in household finance (Bach et al. (2020), Fagereng et al. (2020))

Motivation II : Stochastic Returns To Savings

- Standard optimal taxation model : agents access a unique, deterministic, rate of return to savings.

$\Rightarrow$ convenient assumption

$\Rightarrow$ but recently challenged by :

- Direct empirical evidence of heterogeneous and volatile returns in household finance (Bach et al. (2020), Fagereng et al. (2020))

- Indirect evidence : stochastic returns are needed to replicate observed wealth dynamics using life cycle models (Gabaix et al. (2016), Benhabib and Bisin (2018))

Motivation II : Stochastic Returns To Savings

- Standard optimal taxation model : agents access a unique, deterministic, rate of return to savings.

$\Rightarrow$ convenient assumption

$\Rightarrow$ but recently challenged by :

- Direct empirical evidence of heterogeneous and volatile returns in household finance (Bach et al. (2020), Fagereng et al. (2020))
- Indirect evidence : stochastic returns are needed to replicate observed wealth dynamics using life cycle models (Gabaix et al. (2016), Benhabib and Bisin (2018))

$\Rightarrow$ returns are likely to be stochastic and this could matter for optimal capital taxation.

Motivation III : Wealth correlated returns or "Scale dependence"

Motivation III : Wealth correlated returns or "Scale dependence"

- The rate of return is likely to be correlated with the amount invested :

Motivation III : Wealth correlated returns or "Scale dependence"

- The rate of return is likely to be correlated with the amount invested :

$\Rightarrow$ conjectured by Arrow (1987), Piketty (2013)

Motivation III : Wealth correlated returns or "Scale dependence"

- The rate of return is likely to be correlated with the amount invested :

$\Rightarrow$ conjectured by Arrow (1987), Piketty (2013)

$\Rightarrow$ empirically documented by both Bach et al. (2020) and Fagereng et al. (2020)

Motivation III : Wealth correlated returns or "Scale dependence"

- The rate of return is likely to be correlated with the amount invested :

$\Rightarrow$ conjectured by Arrow (1987), Piketty (2013)

$\Rightarrow$ empirically documented by both Bach et al. (2020) and Fagereng et al. (2020)

$\Rightarrow$ likely important to explain the fast transition in wealth concentration at the top (Gabaix et al. (2016))

Motivation III : Wealth correlated returns or "Scale dependence"

- The rate of return is likely to be correlated with the amount invested :

$\Rightarrow$ conjectured by Arrow (1987), Piketty (2013)

$\Rightarrow$ empirically documented by both Bach et al. (2020) and Fagereng et al. (2020)

$\Rightarrow$ likely important to explain the fast transition in wealth concentration at the top (Gabaix et al. (2016))

- Such scale dependence can give rise to a "rich get richer" effect

Motivation III : Wealth correlated returns or "Scale dependence"

- The rate of return is likely to be correlated with the amount invested :

$\Rightarrow$ conjectured by Arrow (1987), Piketty (2013)

$\Rightarrow$ empirically documented by both Bach et al. (2020) and Fagereng et al. (2020)

$\Rightarrow$ likely important to explain the fast transition in wealth concentration at the top (Gabaix et al. (2016))

- Such scale dependence can give rise to a "rich get richer" effect

$\Rightarrow$ could provide an equity rationale for taxing capital.

Motivation III : Wealth correlated returns or "Scale dependence"

- The rate of return is likely to be correlated with the amount invested :

$\Rightarrow$ conjectured by Arrow (1987), Piketty (2013)

$\Rightarrow$ empirically documented by both Bach et al. (2020) and Fagereng et al. (2020)

$\Rightarrow$ likely important to explain the fast transition in wealth concentration at the top (Gabaix et al. (2016))

- Such scale dependence can give rise to a "rich get richer" effect

$\Rightarrow$ could provide an equity rationale for taxing capital.

$\Rightarrow$ but what about efficiency?

This paper...

This paper...

Suppose that returns are stochastic and can exhibit scale dependence.

This paper...

Suppose that returns are stochastic and can exhibit scale dependence.

1. What are the implications for optimal capital taxation?

This paper...

Suppose that returns are stochastic and can exhibit scale dependence.

1. What are the implications for optimal capital taxation?
2. In particular : do these stochastic, scale dependent returns, rather advocate for capital income or wealth taxation?

Literature and contribution

Literature and contribution

Two recent optimal tax approach depart from the homogeneous rate of return assumption :

Literature and contribution

Two recent optimal tax approach depart from the homogeneous rate of return assumption :

Literature and contribution

Two recent optimal tax approach depart from the homogeneous rate of return assumption :

- Boadway and Spiritus (2021) : Capital taxation and return uncertainty but no scale dependence.

Literature and contribution

Two recent optimal tax approach depart from the homogeneous rate of return assumption :

- Boadway and Spiritus (2021) : Capital taxation and return uncertainty but no scale dependence.
- Gerritsen et al. (2020) Capital taxation and scale dependence but no uncertainty.

Literature and contribution

Two recent optimal tax approach depart from the homogeneous rate of return assumption :

- Boadway and Spiritus (2021) : Capital taxation and return uncertainty but no scale dependence.
- Gerritsen et al. (2020) Capital taxation and scale dependence but no uncertainty.
- Study the interaction between these two features of returns to savings : this paper.

Structure

1 Motivation

2 The Model

3 Conclusion

The Economy

The Economy

The Economy

1. Two periods, no overlap.

The Economy

1. Two periods, no overlap.
2. A continuum of agents work, consume and save in the first-period. All savings are then used for second-period consumption.

The Economy

1. Two periods, no overlap.
2. A continuum of agents work, consume and save in the first-period. All savings are then used for second-period consumption.

3. At the beginning of the first-period, each individual randomly draw a labor productivity parameter θ. (Mirrlees (1971))

The Economy

1. Two periods, no overlap.
2. A continuum of agents work, consume and save in the first-period. All savings are then used for second-period consumption.

3. At the beginning of the first-period, each individual randomly draw a labor productivity parameter θ. (Mirrlees (1971))
4. At the beginning of the second-period, each individual draw a rate of return on savings r.

The Economy

1. Two periods, no overlap.
2. A continuum of agents work, consume and save in the first-period. All savings are then used for second-period consumption.

3. At the beginning of the first-period, each individual randomly draw a labor productivity parameter θ. (Mirrlees (1971))
4. At the beginning of the second-period, each individual draw a rate of return on savings r.
5. The draw of r can depend on savings s (*scale dependence*).

Taxpayers

Taxpayers

I assume (additive) separability between utility from consumption and disutility from work effort $\Rightarrow$ Atkinson and Stiglitz (1976)

Taxpayers

I assume (additive) separability between utility from consumption and disutility from work effort $\Rightarrow$ Atkinson and Stiglitz (1976)

Individuals with productivity θ choose labor income y and savings s to solve :

Taxpayers

I assume (additive) separability between utility from consumption and disutility from work effort $\Rightarrow$ Atkinson and Stiglitz (1976)

Individuals with productivity θ choose labor income y and savings s to solve :

$$U(\theta) \overset{\text{def}}{\equiv} \max_{y,s} \quad u(y-s) + \mathbb{E}\left[v\left((1+r)s - t(s,rs) - T(y)\right) \mid s\right] - h(y,\theta)$$

with:

- $u(.)$, $v(.)$ measuring utility from first and second period consumption and $h(.)$ disutility from work effort.
- $T(y)$ the labor income tax schedule.
- $t(s,rs)$ the capital tax schedule, based on savings s and capital income rs.

The Government

The Government

- The government levies taxes to finance an exogenous amount of public good E

The Government

- The government levies taxes to finance an exogenous amount of public good E
- For simplicity, I assume that both labor income tax $T(y)$ and capital tax $t(s, rs)$ are levied at the same time.

The Government

- The government levies taxes to finance an exogenous amount of public good E
- For simplicity, I assume that both labor income tax $T(y)$ and capital tax $t(s, rs)$ are levied at the same time.

- Government budget constraint :

$$\int_{\theta \in \Theta} \left[T\left(y\left(\theta\right)\right) + \mathbb{E}\left[t\left(s\left(\theta\right), rs\left(\theta\right)\right) | s\left(\theta\right)\right] \right] dG\left(\theta\right) \geq E \qquad (1)$$

Characterization of the optimal capital tax function $t^*(.)$

Characterization of the optimal capital tax function $t^*(.)$

Characterization of the optimal capital tax function $t^*(.)$

- **Objective** : find the optimal capital tax schedule $t^*(.)$ without solving for the optimal labor income tax function $T^*(.)$.

Characterization of the optimal capital tax function $t^*(.)$

- **Objective** : find the optimal capital tax schedule $t^*(.)$ without solving for the optimal labor income tax function $T^*(.)$.
- **Method** : study capital tax reforms that do not affect taxpayers utility but only government revenue.

Characterization of the optimal capital tax function $t^*(.)$

- **Objective** : find the optimal capital tax schedule $t^*(.)$ without solving for the optimal labor income tax function $T^*(.)$.
- **Method** : study capital tax reforms that do not affect taxpayers utility but only government revenue.
- Optimal capital tax $t^*(.)$: generates more government revenue than any other capital tax without changing individual utility.

Optimal Capital Tax when both Savings and Capital Income are observed

Optimal Capital Tax when both Savings and Capital Income are observed

Proposition 1

As long as the government observes both savings and capital income, the optimal capital tax is given by :

$$t^{*}\left(s, rs\right) = rs - \bar{r}(s)s, \forall\left(s, rs\right)$$

with $\bar{r}(s)$ *the average rate of return, conditional on savings* s*.*

Optimal Capital Tax when both Savings and Capital Income are observed

Proposition 1

As long as the government observes both savings and capital income, the optimal capital tax is given by :

$$t^*(s, rs) = rs - \bar{r}(s)s, \forall (s, rs)$$

with $\bar{r}(s)$ the average rate of return, conditional on savings s.

Second-period consumption does no longer depend on the draw of r :

$$c_2 = (1 + \bar{r}(s))s$$

Optimal Capital Tax when both Savings and Capital Income are observed

Proposition 1

As long as the government observes both savings and capital income, the optimal capital tax is given by :

$$t^*(s, rs) = rs - \bar{r}(s)s, \forall (s, rs)$$

with $\bar{r}(s)$ the average rate of return, conditional on savings s.

Second-period consumption does no longer depend on the draw of r :

$$c_2 = (1 + \bar{r}(s))s$$

$\Rightarrow$ full insurance against stochastic returns without distorting savings.

Optimal Capital Tax when both Savings and Capital Income are observed

Proposition 1

As long as the government observes both savings and capital income, the optimal capital tax is given by :

$$t^*(s, rs) = rs - \bar{r}(s)s, \forall (s, rs)$$

with $\bar{r}(s)$ the average rate of return, conditional on savings s.

Second-period consumption does no longer depend on the draw of r :

$$c_2 = (1 + \bar{r}(s))s$$

$\Rightarrow$ full insurance against stochastic returns without distorting savings.

$\Rightarrow$ redistribution only between agents with the **same** amount of initial savings s

Optimal Capital Tax When Only Capital Income is Observed

Optimal Capital Tax When Only Capital Income is Observed

Optimal Capital Tax When Only Capital Income is Observed

- Now suppose that the government does not observe savings s but has only information on capital income rs.

Optimal Capital Tax When Only Capital Income is Observed

- Now suppose that the government does not observe savings s but has only information on capital income rs.

$\Rightarrow$ Impossible to know if a high capital income rs is due to high savings (**effort**) or to a high rate of return (**luck**)

Optimal Capital Tax When Only Capital Income is Observed

- Now suppose that the government does not observe savings s but has only information on capital income rs.

$\Rightarrow$ Impossible to know if a high capital income rs is due to high savings (**effort**) or to a high rate of return (**luck**)

$\Rightarrow$ trade-off between insuring and preserving incentives to save.

Optimal Capital Tax When Only Capital Income is Observed

- Now suppose that the government does not observe savings s but has only information on capital income rs.

$\Rightarrow$ Impossible to know if a high capital income rs is due to high savings (**effort**) or to a high rate of return (**luck**)

$\Rightarrow$ trade-off between insuring and preserving incentives to save.

Proposition 2

In a constrained environment where only capital income is observed, the optimum features a strictly positive tax on capital income :

$$t^*(rs) > 0$$

Optimal Capital Tax When Only The Market Value of Wealth is Observed

Optimal Capital Tax When Only The Market Value of Wealth is Observed

- I call $(1+r)s$, *i.e* wealth evaluated ex post, the *market value* of wealth.

Optimal Capital Tax When Only The Market Value of Wealth is Observed

- I call $(1+r)s$, *i.e* wealth evaluated ex post, the *market value* of wealth.
- Suppose that the only form of capital observed by the government is the market value of wealth

Proposition 3

In a constrained environment where only the market value of wealth is observed, the optimum does feature strictly positive capital taxation:

$$t^*\left(\left(1+r\right)s\right) > 0$$

Optimal Capital Tax When Only Initial Savings Is Observed

Optimal Capital Tax When Only Initial Savings Is Observed

In my framework, savings s can be seen as the *book value* of wealth.

Optimal Capital Tax When Only Initial Savings Is Observed

In my framework, savings s can be seen as the *book value* of wealth.

Proposition 4

In a constrained environment where only initial savings is observed, there is no capital taxation at the optimum

$$t^*(s) = 0$$

Optimal Capital Tax When Only Initial Savings Is Observed

In my framework, savings s can be seen as the *book value* of wealth.

Proposition 4

In a constrained environment where only initial savings is observed, there is no capital taxation at the optimum

$$t^*(s) = 0$$

- A tax on s does not provide any form of insurance.

Optimal Capital Tax When Only Initial Savings Is Observed

In my framework, savings s can be seen as the *book value* of wealth.

Proposition 4

In a constrained environment where only initial savings is observed, there is no capital taxation at the optimum

$$t^*(s) = 0$$

- A tax on s does not provide any form of insurance.
- Equity?

Optimal Capital Tax When Only Initial Savings Is Observed

In my framework, savings s can be seen as the *book value* of wealth.

Proposition 4

In a constrained environment where only initial savings is observed, there is no capital taxation at the optimum

$$t^*(s) = 0$$

- A tax on s does not provide any form of insurance.
- Equity?

$\Rightarrow$ Non-linear labor income taxation is sufficient to fulfill whatever redistributive objective the government pursues

Optimal Capital Tax When Only Initial Savings Is Observed

In my framework, savings s can be seen as the *book value* of wealth.

Proposition 4

In a constrained environment where only initial savings is observed, there is no capital taxation at the optimum

$$t^*(s) = 0$$

- A tax on s does not provide any form of insurance.
- Equity?

$\Rightarrow$ Non-linear labor income taxation is sufficient to fulfill whatever redistributive objective the government pursues

$\Rightarrow$ the logic of Atkinson and Stiglitz (1976) applies

Structure

1 Motivation

2 The Model

3 Conclusion

Conclusion

Conclusion

1. Stochastic returns provide an insurance rationale for taxing capital.

Conclusion

1. Stochastic returns provide an insurance rationale for taxing capital.
2. The correlation between rates of return and savings has to be taken into account when designing the optimal policy.

Conclusion

1. Stochastic returns provide an insurance rationale for taxing capital.
2. The correlation between rates of return and savings has to be taken into account when designing the optimal policy.
3. But scale dependence does not provide a strong rationale for redistributive capital taxes :

Conclusion

1. Stochastic returns provide an insurance rationale for taxing capital.
2. The correlation between rates of return and savings has to be taken into account when designing the optimal policy.
3. But scale dependence does not provide a strong rationale for redistributive capital taxes :
   - redistribution **within** groups of savers in the unconstrained setting.

Conclusion

1. Stochastic returns provide an insurance rationale for taxing capital.
2. The correlation between rates of return and savings has to be taken into account when designing the optimal policy.
3. But scale dependence does not provide a strong rationale for redistributive capital taxes :
   - redistribution **within** groups of savers in the unconstrained setting.
   - no capital tax when only initial savings are observed by the government.

End

Thanks for your attention !

K. J. Arrow. The demand for information and the distribution of income. Probability in the Engineering and Informational Sciences, 1(1):3–13, 1987.

A. B. Atkinson and J. E. Stiglitz. The design of tax structure: direct versus indirect taxation. Journal of public Economics, 6(1-2):55–75, 1976.

L. Bach, L. E. Calvet, and P. Sodini. Rich pickings? risk, return, and skill in household wealth. American Economic Review, 110(9):2703–47, 2020.

J. Benhabib and A. Bisin. Skewed wealth distributions: Theory and empirics. Journal of Economic Literature, 56(4):1261–91, 2018.

R. Boadway and K. Spiritus. Optimal taxation of normal and excess returns to risky assets. Tinbergen Institute Discussion Paper 2021-025/VI, 2021.

A. Fagereng, L. Guiso, D. Malacrino, and L. Pistaferri. Heterogeneity and persistence in returns to wealth. Econometrica, 88(1):115–170, 2020.

X. Gabaix, J.-M. Lasry, P.-L. Lions, and B. Moll. The dynamics of inequality. Econometrica, 84(6):2071–2111, 2016.

A. Gerritsen, B. Jacobs, A. V. Rusu, and K. Spiritus. Optimal taxation of capital income with heterogeneous rates of return. Technical report, CESifo Working Paper, 2020.

J. A. Mirrlees. An exploration in the theory of optimum income taxation. The review of economic studies, 38(2):175–208, 1971.

T. Piketty. Le capital au XXIe siècle. Média Diffusion, 2013.