ON EFFICIENTLY FINANCING RETIREMENT*

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A Looming Question

- With demographics changing,

  How can retirement consumption be efficiently financed?

- An answer:

  Have a large government debt ... but it's infeasible

AN UNPLEASANT CONCLUSION

- Must rely on distortionary tax and transfer schemes

- And more so as population ages

  . . . or at least that is what we thought before now

PROBLEM WITH PREVIOUS ANALYSES

- Use wrong measure of capital stock

- With reasonable estimate of stock

  - Arithmetic becomes pleasant!

  - Government relies much less on costly tax/transfers

  - For both current **and** projected demographics

U.S. Capital Stocks Relative to GDP

- Tangible capital (BEA,FOF)

    - 2.76: Fixed assets

    - 0.31: Consumer durables

    - 0.14: Inventories

    - 0.86: Land

- Intangible capital (our estimates)

    - 1.20: Plant-specific

    - 0.52: Technology capital

    Total = 5.8 GDP ... not 3 GDP!

DEMONSTRATE THAT IT MATTERS

TWO WORLDS

- Common to both:

  - OLG households

  - Firms using both tangible and intangible assets

  - Government policies

- What's different:

  - Current world has 3/4 workers and 1/4 retirees

  - New world has 2/3 workers and 1/3 retirees

TWO PARAMETERIZATIONS

- Capital share parameters set so that

  1. Total stock equals 5.8 GDP (all tangible+intangible)

  2. Total stock equals 2.8 GDP (only fixed assets)

TWO PARAMETERIZATIONS

- Capital share parameters set so that

  1. Total stock equals 5.8 GDP (capital share = .46)

  2. Total stock equals 2.8 GDP (capital share = .30)

- Remaining set to align certain statistics in model and data

MODEL NATIONAL INCOME AND PRODUCT

	Current world		New world	
	High θ	Low θ	High θ	Low θ
Depreciation	.14	.13	.14	.13
Labor income	.60	.70	.59	.70
Capital income	.26	.17	.27	.17
Consumption	.70	.74	.74	.77
Tangible investment	.26	.22	.22	.19
Government spending	.04	.04	.04	.04
Addenda: Intang. inv.	.11	.00	.09	.00

Note: θ=capital share

MODEL NATIONAL INCOME AND PRODUCT

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Note: .6 is consistent with US labor income

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Note: .6 is consistent because GDP=output−intangible investment

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Note: Most G is in consumption

MODEL FIXED ASSETS AND BALANCE SHEETS

- Some notation may help:

  - 2 stocks: tangible T and intangible I

  - 2 values: market value V and reproducible cost K

  - 2 owners: household-business H and government G

MODEL FIXED ASSETS

	Current world		New world	
	High θ	Low θ	High θ	Low θ
Tangible capital (K'_T)	4.1	2.8	4.0	2.7
Household	2.1	3.3	3.4	5.3
Government	2.0	$-.6$	.6	-2.6
Addenda: Intangible (K'_I)	1.8	.0	1.7	.0
Household	.9	.0	1.5	.0
Government	.8	.0	.2	.0

Note: Policy is such that after-tax returns are 4%; pins ownership

MODEL FIXED ASSETS

	Current world		New world	
	High θ	Low θ	High θ	Low θ
Tangible capital (K'_T)	4.1	2.8	4.0	2.7
Household	2.1	3.3	3.4	5.3
Government	2.0	$-.6$	.6	-2.6
Addenda: Intangible (K'_I)	1.8	.0	1.7	.0
Household	.9	.0	1.5	.0
Government	.8	.0	.2	.0

Note: In current world, government effectively owns half

MODEL FIXED ASSETS

	Current world		New world	
	High θ	Low θ	High θ	Low θ
Tangible capital (K'_T)	4.1	2.8	4.0	2.7
Household	2.1	3.3	3.4	5.3
Government	2.0	$-.6$	.6	-2.6
Addenda: Intangible (K'_I)	1.8	.0	1.7	.0
Household	.9	.0	1.5	.0
Government	.8	.0	.2	.0

Note: In new world, government effectively owns 1/7

MODEL FIXED ASSETS

	Current world		New world	
	High θ	Low θ	High θ	Low θ
Tangible capital (K'_T)	4.1	2.8	4.0	2.7
Household	2.1	3.3	3.4	5.3
Government	2.0	$-.6$	.6	-2.6
Addenda: Intangible (K'_I)	1.8	.0	1.7	.0
Household	.9	.0	1.5	.0
Government	.8	.0	.2	.0

Note: Short positions are more evidence against low θ

Model Balance Sheets

	Current world		New world	
	High θ	Low θ	High θ	Low θ
Household Net Worth	3.2	3.8	4.7	5.5
Tangible capital (V_T)	1.9	3.0	3.1	4.8
Intangible capital (V_I)	.5	.0	.9	.0
Government debt (B')	.7	.7	.7	.7
Government Net Worth	2.7	−1.0	1.0	−2.8
Tangible capital ($K_T' - V_T$)	2.2	−.2	.9	−2.1
Intangible capital ($K_I' - V_I$)	1.2	.0	.9	.0
Government debt ($-B'$)	−.7	−.7	−.7	−.7

Note: Taxes put wedge between V and K

Model Balance Sheets

	Current world		New world	
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Government debt (B')	.7	.7	.7	.7
Government Net Worth	2.7	−1.0	1.0	−2.8
Tangible capital ($K'_T - V_T$)	2.2	−.2	.9	−2.1
Intangible capital ($K'_I - V_I$)	1.2	.0	.9	.0
Government debt ($-B'$)	−.7	−.7	−.7	−.7

Note: Implying effective government ownership through taxation

POLICY EXPERIMENT

- Eliminate

    ○ Taxes on capital income

    ○ Transfers to retirees

- While holding fixed

    ○ Debt to GDP

    ○ Spending to GDP

    ○ Tax rates on consumption, labor, dividends

- In 2 worlds and 2 capital share cases

RESULTS AND STEADY-STATE WELFARE GAINS

	Current world		New world	
	High θ	Low θ	High θ	Low θ
Total capital $(K'_T + K'_I)$				
Tax & transfer policy	5.8	2.8	5.7	2.7
Eliminate T&T policy	7.0	3.4	6.8	3.4
Household Net Worth $(V + B')$				
Tax & transfer policy	3.2	3.8	4.7	5.5
Eliminate T&T policy	5.1	5.8	7.0	8.1
Welfare gains (%)	7.7	3.3	9.7	4.2

Note: Gains more than double in the high-θ cases

RESULTS AND STEADY-STATE WELFARE GAINS

	Current world		New world	
	High θ	Low θ	High θ	Low θ
Total capital $(K'_T + K'_I)$				
Tax & transfer policy	5.8	2.8	5.7	2.7
Eliminate T&T policy	7.0	3.4	6.8	3.4
Govt Net Worth $(K' - V - B')$				
Tax & transfer policy	2.7	−1.0	1.0	−2.8
Eliminate T&T policy	1.7	−2.5	−.3	−4.7
Welfare gains (%)	7.7	3.3	9.7	4.2

Note: But, low-θ results rely on negative government capital

RESULTS AND STEADY-STATE WELFARE GAINS

	Current world		New world	
	High θ	Low θ	High θ	Low θ
Total capital $(K_T' + K_I')$				
Tax & transfer policy	5.8	2.8	5.7	2.7
Eliminate T&T policy	7.0	3.4	6.8	3.4
Govt Net Worth $(K' - V - B')$				
Tax & transfer policy	2.7	-1.0	1.0	-2.8
Eliminate T&T policy	1.7	-2.5	$-.3$	-4.7
Welfare gains (%)	7.7	UA	9.7	UA

Note: If infeasible, we're back to unpleasant arithmetic (UA)!

- Parallel code: cohorts distributed across processors

- Experiment:

  - Start with high θ, new world environment

  - Eliminate tax on capital and transfers to old (no delay)

- Findings:

  - If unrestricted, govt capital negative in some years

  - But constraints always violated in low θ case

MUCH MORE TO DO!

- Computing transitions with restrictions on govt capital

- Incorporating annuities and intermediaries

- Assessing intertemporal vs. intratemporal gains

- But know now that consistency with accounts is crucial