An introduction to Generational Wealth Accounts, with applications

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Outline

- Why GWA?
- Stocks vs flows and their connection
- Types of wealth vs GWA vs NTA
- An example
- Which flows to include?
- What discount rate?

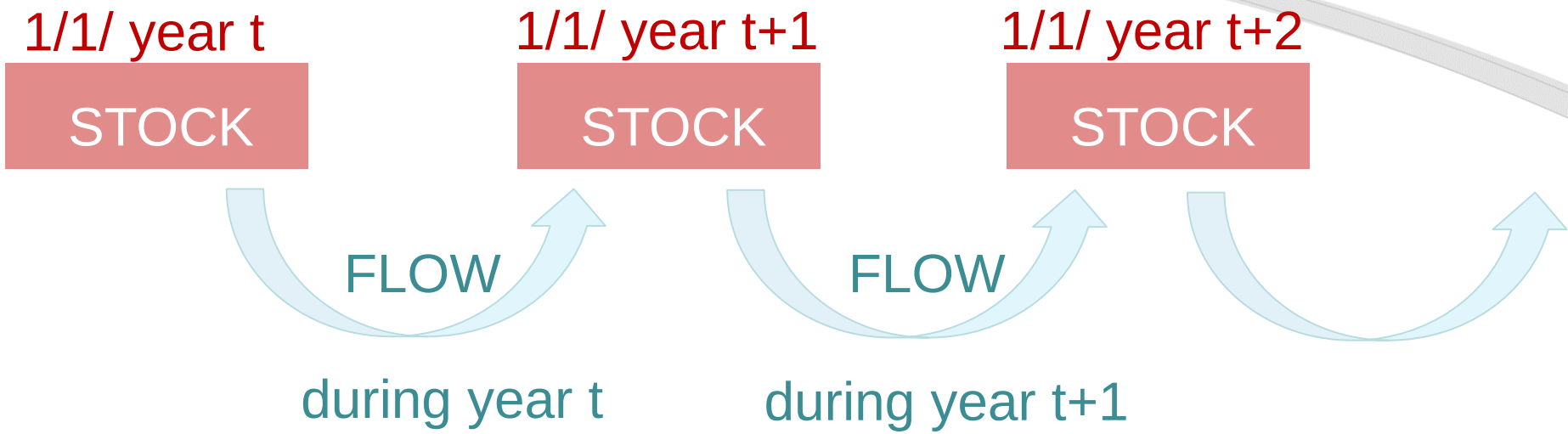
Why GWA?

- NTA is a measure of the flows of resources between different generations in a given period and the institutions (family. State. capital markets) that mediate them
- If NTA is used as a flow measure, what would the stock measure look like and what meaning would it have?

Stocks and flows and their connection

- Most accounting systems have two sets of accounts
  - One counts the stocks and the other the flows
    - Flows measure the changes in the stocks from year to year
  - Ideally, flow and stock measures should be independent
    - Financial accounting
      - Stock: balance sheet / cash balance
      - Flow: income statement / cash flow statement
    - National accounting
      - National accounts, like NTA, track flows of resources
      - Much less complete for stocks
        - » Capital accounts keep track of the stock of capital
        - » “Flow of funds” keep track of financial assets and liabilities
        - » (Stocks otherwise absent in core accounts, satellite accounts treat some aspects)

Stocks vs flows



- This set of relationships can be used to build recursion relationships:
  - Deriving this year's stock from next year's stock and this year's flow (prospective, could be applied recursively from terminal date)
  - Deriving this year's stock from last year's stock and last year's flow (retrospective, applied recursively from time 0)

(DISCOUNTING)

An example, with discounting

- You receive a flow (YL?) of $10 every year for 5 years
- You pay out an amount (C?) of $5 every year for 5 years
- (All flows occur at the beginning of the year)
- Discount rate is 10% per year

Year	Flows		Stock		Interest	
	In	Out	In	Out	In	Out
1	$ 10.00	$ 5.00	$ 41.70	$ 20.85	$ 3.17	$ 1.58
2	$ 10.00	$ 5.00	$ 34.87	$ 17.43	$ 2.49	$ 1.24
3	$ 10.00	$ 5.00	$ 27.36	$ 13.68	$ 1.74	$ 0.87
4	$ 10.00	$ 5.00	$ 19.09	$ 9.55	$ 0.91	$ 0.45
5	$ 10.00	$ 5.00	$ 10.00	$ 5.00	$ -	$ -
6	$ -					

	Stock: In			
Year	Open	Flow	Interest	Close
1	$ 41.70	$ (10.00)	$ 3.17	$ 34.87
2	$ 34.87	$ (10.00)	$ 2.49	$ 27.36
3	$ 27.36	$ (10.00)	$ 1.74	$ 19.09
4	$ 19.09	$ (10.00)	$ 0.91	$ 10.00
5	$ 10.00	$ (10.00)	$ -	$ (0.00)
6				

An example, with discounting

Year-end	Savings
1	$5.50
2	$11.55
3	$18.21
4	$25.53
5	$33.58

- If you take your yearly savings, and put them in a bank account, and it earns the same interest as the discount rate, there are two ways of calculating your savings at the terminal date
  - Calculate the savings balance at the end of the 5 years manually
  - Calculate the PV of the flows in (ignoring interest), subtract the PV of the flows out, and accumulate for 5 years at 10%
    - ($41.70-$20.85)*1.1^5 = $33.58

An example, with discounting

- The same principle applies at any point in time
- Add cash savings plus discounted value of future (non-interest) flows
- This represents the then-value of lifetime resources

Year	Cash	Prosp	Total	Discount
1	$5.50	$17.44	$22.94	$20.85
2	$11.55	$13.68	$25.23	$20.85
3	$18.21	$9.54	$27.75	$20.85
4	$25.53	$5.00	$30.53	$20.85
5	$33.58	$ -	$33.58	$20.85

Apply this to NTA

- Take all the main elements of the NTA flow equation, *excluding* financing-related flows (so savings and asset income, NTA calls these ABR's)

$$N_{k,t}\left(\underbrace{y^{l}_{k,t}}_{\text{Labour Income}} + \underbrace{\tau^{+}_{k,t}}_{\text{Transfers Received}} + \underbrace{y^{a}_{k,t}}_{\text{Asset Income}} + \underbrace{b^{+}_{k,t}}_{\text{Bequests Received}}\right) = N_{k,t}\left(\underbrace{c_{k,t}}_{\text{Consumption}} + \underbrace{\tau^{-}_{k,t}}_{\text{Transfers Paid}} + \underbrace{b^{-}_{k,t}}_{\text{Bequests Paid}} + \underbrace{s_{k,t}}_{\text{Savings}}\right)$$

- Project these into the future in every year, using projected demographic development and assumed (real) growth rate
- Discount them at the expected return on capital and sum, yielding an estimate of the "stock" associated with each flow

GWA

- We divide the main flows of the NTA equation into “resources” and “uses”
- Resources: Labour income, private transfer flows in, government transfer flows in
- Uses: Private consumption, government in-kind consumption, public transfer flows out, private transfer flows out
  - These are “prospective” values: Discounted values of future flows, add them in the right way and you get discounted present value of future saving (excluding capital transfers)
- Include the current value of assets owned by each cohort
  - This is a “retrospective” value of the past earning, spending and transfers received and paid by each cohort (including past capital transfers)

Cohort inter-temporal BC from NTA

- For each cohort, the NTA equation, discounted and summed, is called the cohort's inter-temporal budget constraint

$$\underbrace{\sum_{t=0}^{\omega+k} N_{k,t} y^{l}_{k,t} (1+r)^{-t}}_{\text{Human Capital}} + \underbrace{N_{k,0} w_{k,0}}_{\text{Net Wealth}} + \underbrace{\sum_{t=0}^{\omega+k} N_{k,t} \tau^{+}_{k,t} (1+r)^{-t}}_{\text{P.V. of Transfers Received}} + \underbrace{\sum_{t=0}^{\omega+k} N_{k,t} b^{+}_{k,t} (1+r)^{-t}}_{\text{P.V. of Bequests Received}} + \underbrace{FS^{p}_{k,0}}_{\text{Private Funding Shortfall}}$$

$$= \underbrace{\sum_{t=0}^{\omega+k} N_{k,t} c_{k,t} (1+r)^{-t}}_{\text{P.V. of Total Consumption}} + \underbrace{\sum_{t=0}^{\omega+k} N_{k,t} \tau^{-}_{k,t} (1+r)^{-t}}_{\text{P.V. of Transfers Paid}} + \underbrace{\sum_{t=0}^{\omega+k} N_{k,t} b^{-}_{k,t} (1+r)^{-t}}_{\text{P.V. of Bequests Paid}}$$

- Items on the LHS (top line) are resources
- Items on the RHS (bottom line) are uses
- Blue items are prospective, green are retrospective, red are determined as balancing items

Interpretation of cohort's GWAs

- PV(YL) = Human capital
- Wealth = Share of physical + financial capital
  - Physical capital is handled in National Accounts
  - Financial capital in the Flow of Funds

] Macro controls?

- PV(TGI-TGO) = Public transfer wealth (social capital I?)
- PV(TFI-TFO) = Private transfer wealth (social capital II?)

- If you include the unborn as a generation, you can also use transversality conditions for public sector and overall to calculate implied transfers to and from the unborn

Projecting cash flows (I)

- In general, we assume that p.c. flow profiles increase at a constant rate reflecting productivity growth (1.5% p.a.)
- But there are some problems
  - TFI and TFO do not balance (RoW) and become increasingly unbalanced as demographic structure changes
    - We force the balance from time 0 and in each future year by setting TFI* = 0.5*(TFI+TFO) = TFO*
    - Demographic burden of changing fertility shared equally between parents and children
  - TGI and TGO do not balance (borrowing) and balance changes as demographic structure changes
    - Assume unlimited borrowing/lending to/from public sector

Projecting cash flows (II)

- Fixed profiles with changing demography means that capital must be sold/bought by nationals
- We assume that foreigners provide the capital necessary to keep K/L ratio constant
- (Makes sense in small, open economies – i.e., UK Position in the US is more difficult)

- For some of the accounts, we balance future flows n each year to long-term public projections of government spending and revenue (CBO in the US, OBR in the UK)

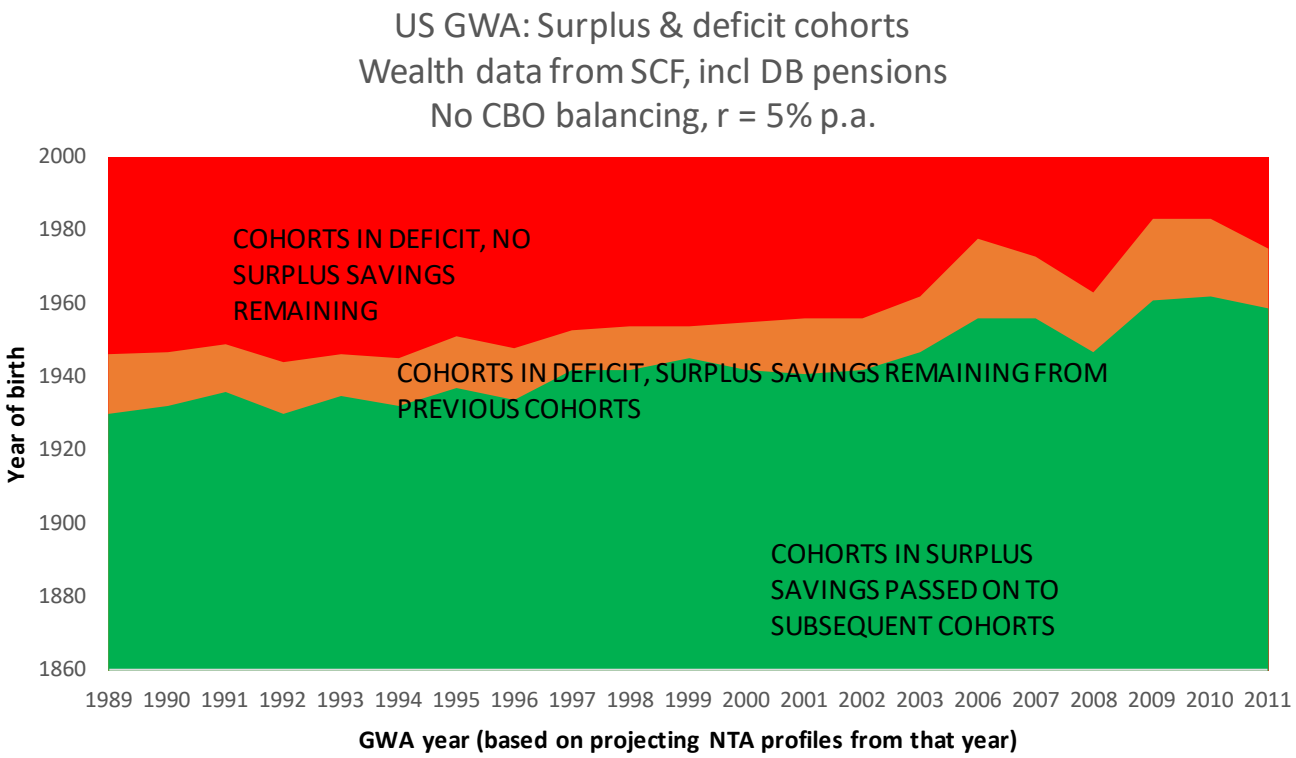
Calculating GWAs

- You need:
  - A set of NTAs
  - Data on wealth holdings by age (including the present value of DB pensions, but not state pensions that are incorporated in the TG NTA profiles). We use data from surveys that are specifically designed for this purpose
  - A set of national account aggregates to balance the wealth data to (many statistical offices prepare balance sheets as part of the SNA)
  - A measure of public sector net wealth (we use administrative data from various sources to ensure a consistent treatment of the pensions of government employees)
- We can supply you with computer code (STATA, R)

Current projects

- Calculating GWAs for US and UK
  - US we have annual estimates going back to 1981
  - UK we have annual estimates going back to 2006
- Incorporating investment into the GWA framework
  - GWA's, as presented here, are a savings-based model. There is no investment. But capital influences the productivity of workers. For large economies (US, China, Japan. Etc.), this is necessary for long-term consistency between the profiles
- Analyze changes in GWAs over time to assess how the well-being of different generations has changed in response to financial shocks, and how transfer systems have responded to share risk across the population

Some results (I): USA GWA*



- Position depends heavily on asset prices (housing boom and bust are visible)
- Key issue seems to be relative value of return on assets and the discount rate

Some results (II): Changes in GWA over the financial crisis*