Political sustainability of intergenerational transfers
An empirical application

G. Michailidis C. Patxot
Univeristy of Barcelona (UB), XREPP (CAEPS)

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Outline

1. Motivation & Introduction
2. Research Goal
3. Data & Methodology
4. Results
5. Summary & Conclusions

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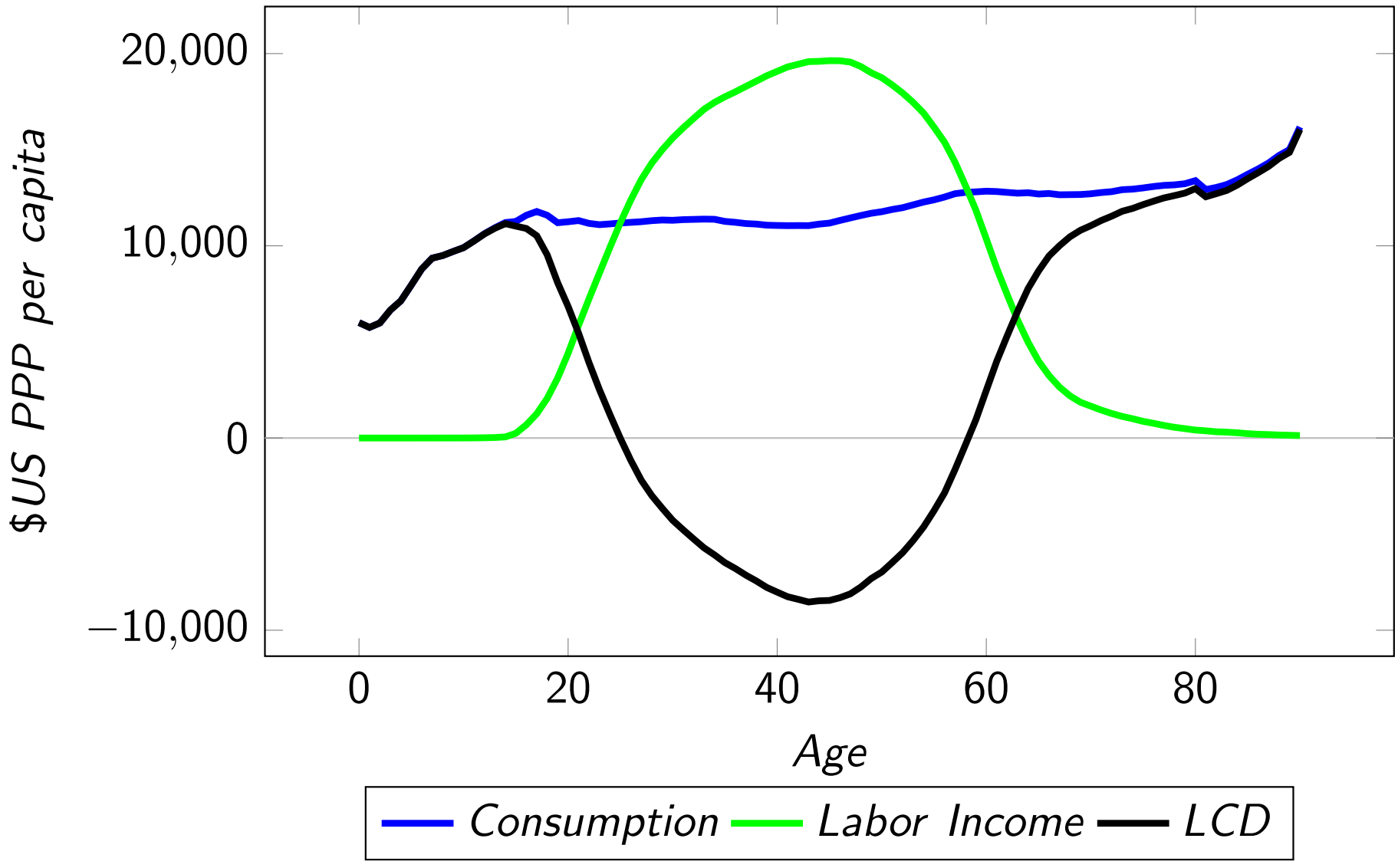
Economic Life Cycle

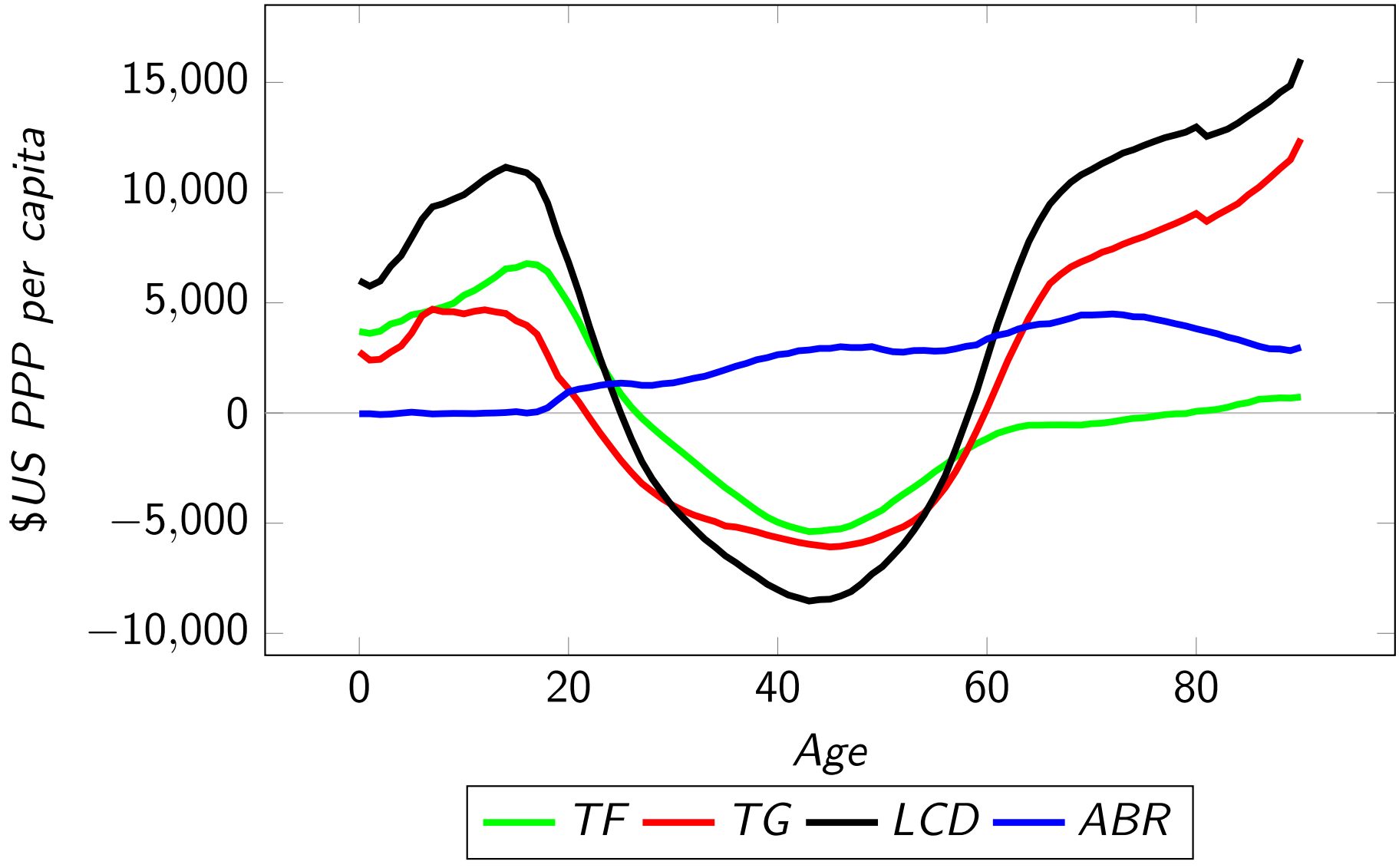


Life Cycle Deficit and Intergenerational Transfers

- Mismatch between material needs and the ability to satisfy them through own labour.
- Need for intergenerational transfers (henceforth, IGTs) - reallocations of economic resources among generations.
- These reallocation of economic resources are undertaken by:

1. **Financial markets** allow individuals to borrow at one age and lend at another; or to accumulate assets during the working years, which support consumption later in life.
2. **Families** support their members with intra-family transfers like loans, inter-vivos, bequests, etc.
3. **Governments** tax the working age generation to provide economic support for both children and the elderly.

Intergenerational Transfers and Life Cycle Deficit



Main Problem

- Markets and intra-family arrangements are unable to deliver Pareto optimal investments for children and elderly (Becker & Murphy, 1988).
- Emerging need for government intervention in the functioning of IGTs.
- Financing only public pensions or public education is not sufficient in order to achieve economic efficiency (Boldrin & Montes, 2005).

Solution

- Link between public education and pension provides generations with the appropriate incentives to reallocate public funds.
- Pogue & Sgontz (1977) PAYG pension system and incentives to invest in public education.
- Konrad (1995) and Kemnitz (2000) suggest that even in the absence of altruism, the working-age generation is willing to pay for public education only if they can "reap" gains by taxing the results of the higher productivity in the future.
- This type of social contract -where public pensions are properly linked to earlier investments in education- achieves a complete market allocation (Boldrin & Montes, 2009).

Political Sustainability of Pensions

- Construct streams of taxes and benefits and compare them computing the net present value for the median voter.
- Bohn (1999) finds the net present value positive for agents above 45 years old and suggests that the US social security system is sustainable.
- However, computing present values involves interest rate that might be affected by social security [Feldstein (1974); Barro (1974); Cooley & Soares (1999)].

Political Sustainability of Pensions and Education

Rangel (2003) investigates the ability of non-market intergenerational arrangements to invest optimally in forward (FITs) and backward (BITs) transfers in order to sustain politically a system of public IGTs.
Every period the middle aged generation makes two decisions:

1. How much to invest on FITs, that only benefits future generations.
2. How much to spend on BITs, that only benefits the current old.

Three conditions must be satisfied

1. At least two exchange problems that require simultaneous cooperation.
2. IGTs must generate positive continuation surplus to be backed by working-age generation.
3. The generations must play a game of simple trigger strategies (STS) that creates the link between BITs and FITs.

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Research Question & Goal

- Would the generations choose to provide publicly intergenerational transfers (e.g., pensions and education) if this decision *per se* was put under voting?

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- The main goal is to assess if a system of public intergenerational transfers can be politically sustained.

Outline

Data-The National Transfer Accounts Project

Conventional economic accounts

- Conventional economic accounts do not favor us to analyse how people behave at different stages of the economic life cycle
- Fail to capture crucial information on the age direction of public transfers

NTA

- We employ NTA estimates for 18 countries (Lee and Mason, 2011)
- Public pension and education transfers
- Total public transfers, BITs and FITs (health care, in-kind and in-cash, inflows and outflows)
- Data on demographic structure (proxy for electorate)

Methodology

- The empirical exercise is based on the political economy application proposed by Rangel (2003).
- We apply the specific structure of NTA data on this political economy application in order to asses the political sustainability of the system that links backward (e.g., pensions) and forward (e.g., education) IGTs.
- We adjust that application for the case of public pensions and education and the case of total public FITs and BITs.

Political Economy Application: Setting

- Agents live for 9 periods and each period is a decade. First two periods young children, next five periods working-age adults, last two periods retirees.
- Use of more realistic demographic structure. Demographics
- Working cohorts receive wage, no other cohort receives labor income
- Decisions are made by majority rule (society) rather than middle aged.
  1. Every period society chooses BITs (e.g., PAYG pensions, health care, etc.) that benefit only the retirees (B_i)
  2. Society also chooses the level of FITs (e.g., education, health care, etc.) that benefit children and future generations (E_i)

Political Economy Application: Continuation Value

The continuation value (henceforth, CV) of the system for generation i, at age a, is given by

$$CV_a = \sum_{i=8}^{9} \frac{PB_i}{(1+r)^{i-a}} - \sum_{i=a}^{7} \frac{PT_i}{(1+r)^{i-a}} \tag{1}$$

for a worker of age a, and

$$CV_a = \sum_{i=8}^{9} \frac{PB_i}{(1+r)^{i-a}} \tag{2}$$

continuation value for the retirees of age $a = 8, 9$

- In this setting CV_a measures the value for an agent of age group (a) of keeping the social security system functioning.
- BITs can be only sustained if CV_a is positive for the majority of voters.

Political Economy Application: Voting

- Let's assume that $\gamma = \left\{ \hat{T}_i, \hat{E}_i \right\}_{i=1}^{\infty}$ is the path for fiscal policy. Every period the majority of voters can choose to spend or not on BITs, $T_i \in \left\{0, \hat{T}_i\right\}$ and on FITs, $E_i \in \left\{0, \hat{E}_i\right\}$
- It is assumed that every agent $a \geqslant 3$ casts a vote for pensions and education.

Proposition

1. A path γ with a positive BITs can be sustained as an equilibrium as long as the CV is non-negative for all $a \geqslant 6$ (representative voter)
2. A path γ with a positive FITs can be sustained as an equilibrium as long as

$$CV_a \geqslant (\frac{\hat{E}}{7}) \geqslant 0 \tag{3}$$

   at least for $a = 5, .., 8$, in case of representative voter

$$CV_a \geqslant \hat{E} P_a \tag{4}$$

3. Agents have to play voting strategies that link BITs and FITs.

Practical Exercise

Steps:

1. Measure the CV for BITs (Eq.1 and Eq.2 or Eq.5)

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3. Gauge the voting outcomes using demographic structure as a proxy for the electorate size of each cohort.

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2. Compute the CV for the system of FITs and BITs (Eq.3 or Eq.4).

3. Gauge the voting outcomes using demographic structure as a proxy for the electorate size of each cohort.

4. Assess the sustainability of the system of IGTs.

Outline

Continuation Values: Pensions Transfers

Country	CV3	CV4	CV5	CV6	CV7	CV8	CV9
Austria	-45.049	22.627	115.223	219.421	312.111	374.165	206.664
Brazil	-20.797	-20.480	-10.319	12.260	40.298	80.584	44.210
Costa Rica	-13.956	-6.155	5.360	19.203	33.398	44.577	20.414
Finland	-73.976	-20.978	57.938	144.292	216.533	242.355	121.095
Germany	-43.184	-7.935	60.574	147.478	232.267	288.043	143.717
Hungary	-56.584	-27.156	22.544	76.746	116.893	124.785	64.183
India	-2.909	-1.755	-137	1.698	3.852	6.098	3.238
Japan	-47.645	-20.595	19.732	72.614	129.101	164.056	65.588
Mexico	-20.890	-14.223	-4.591	6.011	13.144	17.234	7.940
Slovenia	-67.928	-30.221	31.077	90.867	133.616	158.028	77.067
South Korea	-30.272	-24.535	-15.987	-6.373	2.824	9.815	1.888
Spain	-59.423	-26.995	28.131	92.044	142.951	167.603	81.416
Sweden	-90.612	-17.526	87.126	205.319	328.886	411.976	202.918
Taiwan	-37.026	-31.258	-21.991	-11.503	-2.850	2.139	1.127
Thailand	-15.950	-13.912	-10.998	-7.115	-3.125	113	57
US	-63.071	-37.726	15.610	81.181	148.336	195.378	101.788

Note: *CVs are calculated converting currencies to US dollars (per capita) based on purchasing power parity (PPP) ratios in a particular year for each country.*

Voting Scenarios: Pensions and Education Transfers

	Voting on Pensions					Voting on Pensions & Education				
Country	VR	VDS	VSIR	BY	WY	VR	VDS	VSIR	BY	WY
Austria	85,71	83,12	83,12	79,24	86,76	57,14	56,16	78,69	77,53	75,23
Brazil	57,14	25,83	100	21,59	58,49	42,86	24,26	98,42	20,99	45,66
Costa Rica	71,43	46,14	46,14	40,58	73,78	57,14	44,22	44,22	38,81	60,48
Finland	71,43	65,85	65,85	51,48	69,87	57,14	61,49	61,49	50,24	58,08
Germany	71,43	64,33	85,28	60,92	74,93	57,14	59,94	80,90	59,46	64,15
Hungary	71,43	61,74	61,74	54,30	70,71	57,14	58,02	58,02	52,94	60,63
India	57,14	24,26	24,26	21,85	55,37	42,86	23,40	23,40	21,13	46,62
Japan	71,43	65,47	65,47	46,22	75,38	57,14	60,46	60,46	45,38	61,40
Mexico	57,14	24,80	24,80	23,26	57,95	42,86	23,18	23,18	22,40	45,55
Slovenia	71,43	61,75	61,75	54,41	73,04	57,14	58,60	58,60	52,76	61,93
S. Korea	42,86	15,01	15,01	10,06	46,27	28,57	13,77	13,77	9,21	16,31
Spain	71,43	57,97	57,97	49,91	73,92	57,14	53,65	53,65	48,25	61,79
Sweden	71,43	64,74	64,74	56,99	70,01	57,14	58,55	58,55	54,82	58,30
Taiwan	28,57	6,53	6,53	-	-	14,29	5,20	5,20	-	-
Thailand	28,57	6,54	6,54	3,56	26,24	0	0	0	0	0
US	71,43	59,95	59,95	52,07	68,71	42,86	34,17	34,17	31,96	42,71

Political Sustainability: Pensions and Education Transfers

Country	VR	VDS	VSIR	BY	WY
Austria	Sustained	Sustained	Sustained	Sustained	Sustained
Brazil	Not	Not	Sustained	Not	Not
Costa Rica	Sustained	Not	Not	Not	Sustained
Finland	Sustained	Sustained	Sustained	Sustained	Sustained
Germany	Sustained	Sustained	Sustained	Sustained	Sustained
Hungary	Sustained	Sustained	Sustained	Sustained	Sustained
India	Not	Not	Not	Not	Not
Japan	Sustained	Sustained	Sustained	Not	Sustained
Mexico	Not	Not	Not	Not	Not
Slovenia	Sustained	Sustained	Sustained	Sustained	Sustained
South Korea	Not	Not	Not	Not	Not
Spain	Sustained	Sustained	Sustained	Not	Sustained
Sweden	Sustained	Sustained	Sustained	Sustained	Sustained
Taiwan	Not	Not	Not	-	-
Thailand	Not	Not	Not	Not	Not
US	Not	Not	Not	Not	Not

Results on Pensions & Education

- Younger workers receive in present values fewer benefits than the taxes they pay, hence their CVs have a negative sign.
- Retirees fully support the system because they enjoy retirement benefits without paying any more taxes.
- Bohn (1999) finds similar results calculating the CV of PAYG social security in US.
- Demographic transition has a big impact in favor of sustaining the system of pensions and education. Intuitively, any demographic change that increases the CV of the median voter and hence his/her political support for pensions will also increase the education expenditure that can be sustained.

  Demographic Transition
- It seems that developed countries would back politically such an intergenerational arrangement.

Continuation Value for Total Public Backward Transfers

In the case of total public BITs we adjust the formula for CV in order to capture the benefits that the middle aged receive and the taxes that the elderly might be paying.

$$CV_a = \sum_{i=a}^{9} \frac{B_i - T_i}{(1+r)^{i-a}} \tag{5}$$

where B are benefits (received) and T are taxes paid by cohorts ($a \geq 3$) for total public transfers. The CVs for the system of BITs and FITs are calculated as before.

Continuation Values: Total BITs

Country	CV3	CV4	CV5	CV6	CV7	CV8	CV9
Austria	116.759	200.851	324.282	462.498	512.525	394.904	224.439
Brazil	-11.290	-6.318	18.047	58.877	78.975	73.906	43.133
Costa Rica	24.491	35.445	55.533	79.842	89.322	74.576	40.300
Finland	72.115	137.836	267.056	406.803	479.540	371.168	224.679
Germany	66.614	101.477	209.753	348.485	456.041	382.131	234.291
Hungary	28.951	59.340	140.305	237.132	283.061	204.029	104.942
India	-1.778	-600	519	1.148	1.635	1.612	1.325
Indonesia	-6.542	-5.040	-2.918	-701	701	847	425
Japan	30.560	63.883	131.474	226.446	317.498	267.527	155.417
Mexico	17.802	24.759	42.105	60.191	62.456	48.344	22.921
Philippines	-9.944	-8.906	-6.676	-3.935	-856	128	-244
Slovenia	71.433	114.753	212.301	302.837	315.782	235.287	126.627
South Korea	-6.245	2.851	23.459	44.863	53.484	37.116	15.704
Spain	-47.451	-20.166	49.278	137.278	195.204	165.904	90.720
Sweden	153.341	226.425	355.452	522.530	687.532	611.277	387.882
Taiwan	-9.096	-3.078	30.420	68.044	84.687	70.803	36.927
Thailand	-19.106	-18.730	-14.879	-8.226	-2.224	393	1.140
US	34.878	49.256	141.447	262.920	381.279	345.935	219.527

Note: *CVs are calculated converting currencies to US dollars (per capita) based on purchasing power parity (PPP) ratios in a particular year for each country.*

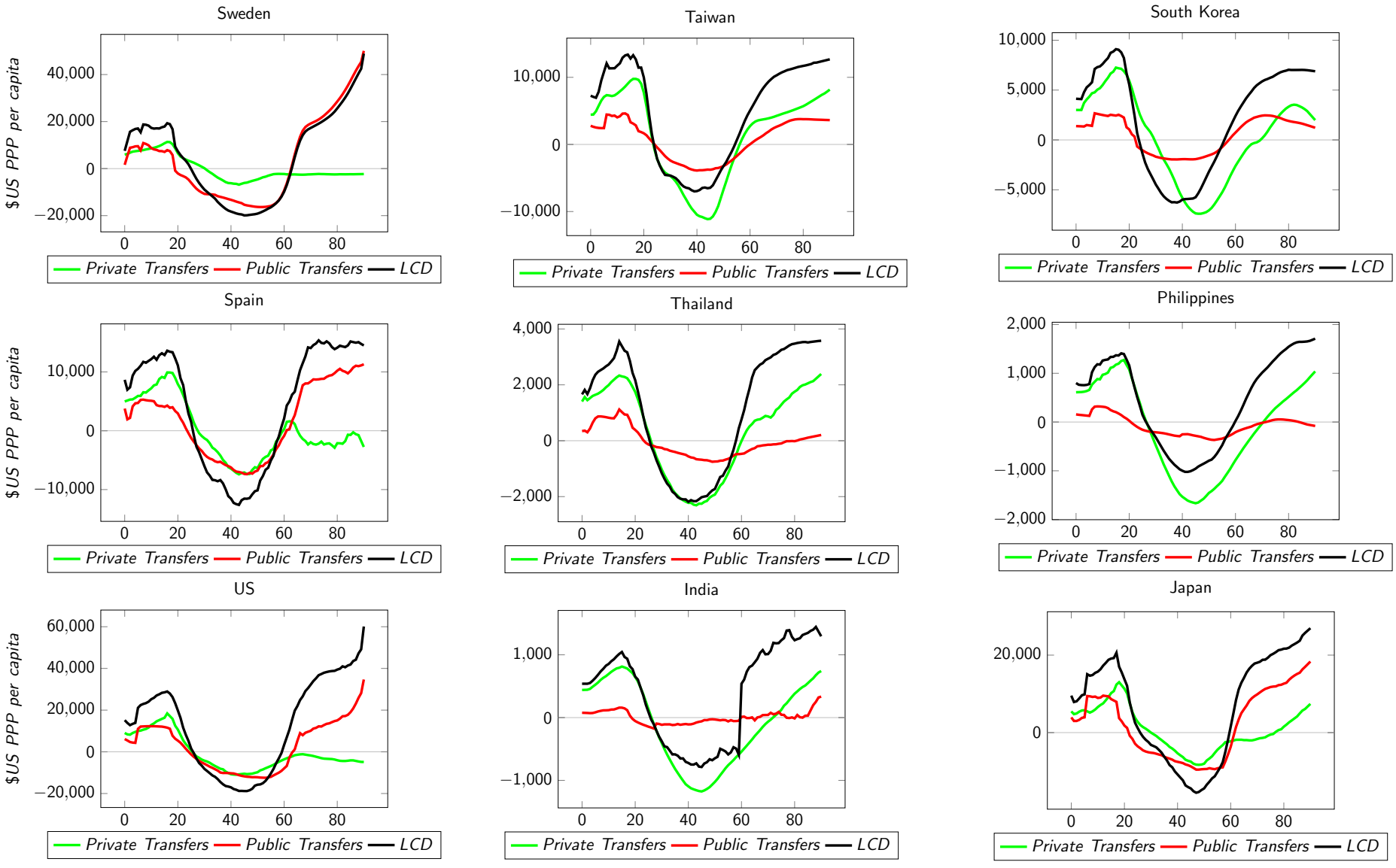
Voting Scenarios: Total BITs and FITs

	Voting on BITs					Voting on BITs & FITs				
Country	VR	VDS	VSIR	BY	WY	VR	VDS	VSIR	BY	WY
Austria	100	100	100	100	100	85,71	95,57	95,57	98,29	88,46
Brazil	71,43	44,06	100	39,52	72,93	57,14	42,49	98,42	38,91	60,10
Costa Rica	100	100	100	100	100	85,71	98,09	98,09	98,22	86,70
Finland	100	100	100	100	100	85,71	95,64	95,64	98,77	88,21
Germany	100	100	100	100	100	85,71	95,62	95,62	98,54	89,22
Hungary	100	100	58,02	52,94	60,63	85,71	96,28	58,02	52,94	60,63
India	71,43	43,52	43,52	40,72	71,09	57,14	42,66	42,66	40	62,34
Indonesia	42,86	12,86	12,86	10,98	40,06	28,57	12,06	12,06	10,22	14,49
Japan	100	100	100	100	100	85,71	94,99	78,22	68,52	86,02
Mexico	100	100	100	100	100	85,71	98,38	67,37	99,14	87,60
Philippines	14,29	2,87	2,87	2,79	13,03	14,29	2,87	2,87	2,79	0
Slovenia	100	100	100	100	100	85,71	96,85	96,85	98,35	88,88
South Korea	85,71	74,90	74,90	67,95	87,61	57,14	47,64	47,64	41,64	60,10
Spain	71,43	57,97	57,97	49,91	73,92	57,14	53,65	53,65	48,25	61,79
Sweden	100	100	100	100	100	85,71	93,81	93,81	97,82	88,30
Taiwan	71,43	47,94	47,94	-	-	57,14	46,61	46,61	-	-
Thailand	28,57	6,54	6,54	3,56	26,24	0	0	0	0	0
US	100	100	100	100	100	71,43	76,36	55,68	73,37	89,41

Political sustainability: Total BITs and FITs

Country	VR	VDS	VSIR	BY	WY
Austria	Sustained	Sustained	Sustained	Sustained	Sustained
Brazil	Sustained	Not	Sustained	Not	Sustained
Costa Rica	Sustained	Sustained	Sustained	Sustained	Sustained
Finland	Sustained	Sustained	Sustained	Sustained	Sustained
Germany	Sustained	Sustained	Sustained	Sustained	Sustained
Hungary	Sustained	Sustained	Sustained	Sustained	Sustained
India	Sustained	Not	Not	Not	Sustained
Indonesia	Not	Not	Not	Not	Not
Japan	Sustained	Sustained	Sustained	Sustained	Sustained
Mexico	Sustained	Sustained	Sustained	Sustained	Sustained
Philippines	Not	Not	Not	Not	Not
Slovenia	Sustained	Sustained	Sustained	Sustained	Sustained
South Korea	Sustained	Not	Not	Not	Sustained
Spain	Sustained	Sustained	Sustained	Not	Sustained
Sweden	Sustained	Sustained	Sustained	Sustained	Sustained
Taiwan	Sustained	Not	Not	-	-
Thailand	Not	Not	Not	Not	Not
US	Sustained	Sustained	Sustained	Sustained	Sustained

Intergenerational Transfers and Life-Cycle-Deficit



Results on Total IGTs

- CVs are positive for the most of the cohorts.
- In the case of the system of total public IGTs, we calculate higher political support.
- The main difference between two exercises is attributed to the different type of data.
- Most of Asian countries have a non-sustained system of BITs and FITs.
  - Negative continuation values even for the old cohorts.
  - Early stage of development in terms of IGTs.
- Demographic transition, especially population ageing has positive effect on political support for BITs and hence for FITs.

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To wrap up

- We employ the specific structure of NTA data to conduct an empirical exercise using the political economy application of Rangel (2003).
- The aim is to test if a system of IGTs can be politically sustained. Would the electorate support a system of IGTs via voting.
- We find that most of the developed countries would vote for a system of backward and forward IGTs like pensions and education if the choice was put under voting in a particular year.
- Ageing can be beneficial for future generations.

Conclusions

- How an increasing political viability will interact with a decreasing financial feasibility?
- Ageing pressure in financial health of the PAYG pensions system indicate a conflict between financial and political sustainability.
- Nevertheless, the fact that ageing also fosters support for the linked system, might create some positive feedback, increasing resources for education.
- This, in turn, improves future financial prospects of the PAYG system.
  Could pensions be pre-funded by increasing education expenditure?
- Our findings and previous theoretical research suggest that it might be a useful reform to require legislation to vote on pensions and education as a unique social policy package.

The End

Thank you!

e-mail: g.michailidis@ub.edu

Demographic Structure of Population per Country

Country	C3	C4	C5	C6	C7	C8	C9
Australia	19,50	20,83	20,41	17,01	10,91	7,81	3,53
Austria	16,41	20,85	20,24	15,44	13,19	9,08	4,79
Brazil	29,73	25,21	19,48	12,30	7,74	4,17	1,37
China	24,66	27,03	20,18	13,24	8,77	4,65	1,47
Costa Rica	29,07	24,69	20,92	12,37	7,04	4,13	1,77
Finland	16,78	17,18	19,44	20,08	12,71	9,38	4,44
Germany	14,82	20,56	19,54	15,15	15,72	9,61	4,61
Hungary	20,00	18,42	17,57	18,10	13,16	9,44	3,32
India	31,27	24,52	19,12	12,54	7,82	3,72	1,01
Indonesia	33,44	26,36	17,18	11,35	7,69	3,24	0,76
Japan	16,68	17,84	15,49	18,78	15,31	10,80	5,10
Mexico	31,23	26,19	18,70	11,56	7,02	3,67	1,64
Slovenia	19,21	19,17	20,17	16,46	12,74	9,11	3,14
S. Africa	33,17	24,75	18,55	12,67	7,17	2,94	0,74
S. Korea	25,51	26,22	20,22	13,14	9,35	4,30	1,25
Spain	21,44	20,63	17,04	14,12	12,92	9,61	4,24
Sweden	16,30	19,05	17,44	18,53	12,69	9,79	6,21
Taiwan	25,13	26,10	21,20	11,39	9,28	5,39	1,51
Thailand	25,70	24,07	21,33	14,44	9,04	4,44	0,98
US	19,28	20,85	21,51	16,35	10,11	7,58	4,32

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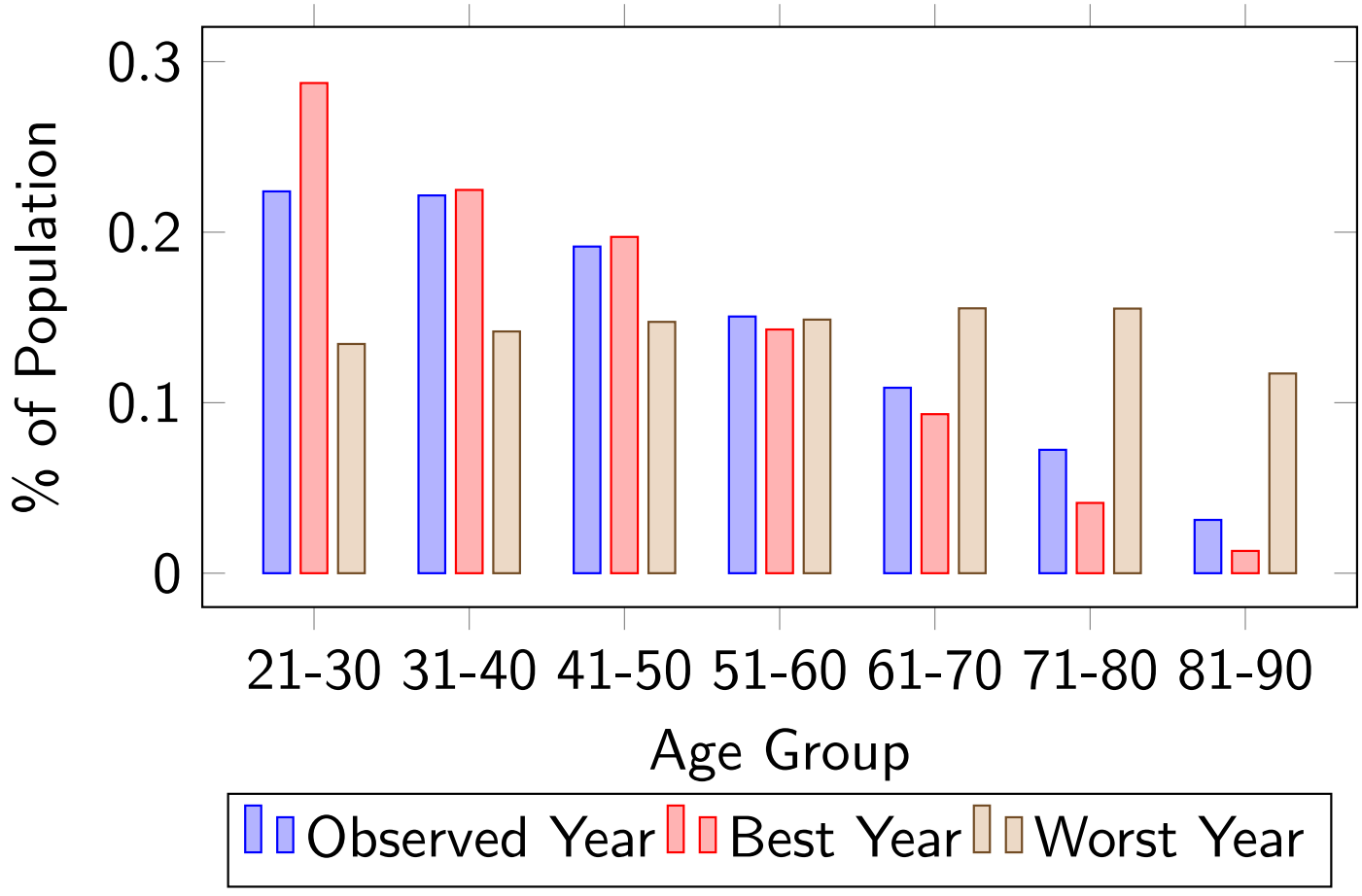
Demographic Transition



Back to Results