

AGING OF POP – LECTURE NOTES ©
Isaac Ehrlich, March 2001

1. Abstract

- **Population aging throughout the developed world:**
 - **Ubiquitous: Europe, America, Japan, Asia's big tigers**
 - **twin forces: Longevity up, fertility down**
- **Causes: Why the trend?**
- **Consequences:**
 - **Implications for growth & welfare: blessing or curse?**
 - **Implications for Public Policy: How best to deal with prob?**
Ben Franklin: "Nothing in this world is certain but death & taxes". Will pop aging diminish or intensify this connection?

2. Evidence

A. Longevity trends:

- **Common to both males and females**
- **Common to rich and poor – NW catching up – TAB 1**
- **Pace increases in 2nd half of 20th century for age 40 & up**
- **Trend common to all age groups; fastest growing? – TAB 2**

B. Fertility trends:

- **Uninterrupted decline in crude birth, TFR in US (ex baby boom) – TAB 3**
- **Situation worse in Italy, Spain, Germany, HK, Singapore – TAB 5**

3. Reasons

A. Prolonging life = oldest human aspiration. In modern economics:

- Longevity is a good: quantity of life, complement to quality (JPE 1990 , JHE 2000). Causes for trend:
- Growth of total wealth, human capital especially
- Not simply technological change: we demand technology & pay for it (%GNP 4.5 in 50, 13.61 in 1996) – See TAB 4

B. Fertility:

- Part of stylized facts of demographic transition from high mortality, fertility, & low income, to low mortality, fertility, high & growing income.
- Consequence of steady growth regimes where emphasis shifts from quality to quantity of children, and growing participation of women in LF.

3. Net Effect

- Population aging. Now 12.75% of pop in US are 65 & up. Was 6.13% in 1935. See TAB 4:
- In Japan pop 65& up 16.2 today. 1 in 4 in 2015.

4. \$64,000 (or 1 million dollar) question:

- Is aging of pop a blessing or curse? a mark of human advancement or a drag on the economy? Synthesize answer based on
 - Individual and free-market perspective
 - Government policy perspective

5. Answer:

- provided by applying models of endogenous growth.

A. Private Perspective

- **Apply the model of ENDOGENOUS economic growth. Growth is not the result of accidents (Isaac Newton & gravity, Mme Curie breaking the test tube & radium), but due to internal forces.**
- **Main factor: HK accumulation (knowledge not s.t. DRTS).**
- **In this context, longevity (both P_{i1} and P_{i2}) is a blessing! Why? (recall that L.E. rises from 48 in 1901 to 76 for m. and 81 for f.)**
 - i. **People invest more in themselves**
 - ii. **Parents invest more in children to obtain emotional rewards and old-age material benefits - informal care.**
 - iii. **Family acts as an efficient intergenerational partnership or “private security” system, supporting the growth process.**
 - iv. **Indeed, evidence shows that improved P_{i1} and P_{i2} can trigger an economic takeoff for LDCs, with $E(P_{i1}) > E(P_{i2})$.**
 - v. **During transition, fertility ultimately falls: growth in opp. Cost of time, especially for mothers, makes parents prefer quality to quantity of kids.**

A. Public Perspective

- a. **Government’s response to political dynamics:**
 - **Political pressure to institute COMPULSORY old-age SS, starting w/ Bismark. Gov. mandates contributions by workers, employers.**
 - **Rationale: some “market failure” a. People fail to care for old-age needs through saving; b. capital markets underdeveloped. But b. fails empirical test: Most LDCs have no SS system.**
 - **Perhaps the argument is one of “free riding” in developed welfare states. This explains Bismark’s idea: forced savings!**
- b. **But Actual system established: Not a provident fund, but an un-funded, PAYG, defined-benefits system.**

6. Impact of PAYG, Defined Benefits System:

A. How the System Operates:

- **PAYG = contributions of workers finance benefits to recipients over designated age w/o pre-funding or investment of balances.**
- **Loose connection between benefits & contributions at individual level – either themselves or their children**
- **Benefits, controlled by politicians have become generous (in US after 1972 where replacement ratio = .42%).**

B. Financial Performance:

- **Improve lot of the elderly, but also caused massive unintended redistribution of income between young and old.**
- **Facing specter of financial collapse at current structure - in US after 2034.**
Why? Aging of pop lowers worker-support ratio. In US, WSR = 10/1 in 1950, but is 3.3/1 today, expect 2/1 in 2030. Much worse situation in Japan, France, Germany.
- **Bottom line: very low rate of return: 1.05% for those born in 1970, negative for those entering today (18 yrs old will pay \$700K till 65 and obtain \$140K at 65).**
- **Consequence: continuous rise of tax rate from 2% of payroll in 1937 to 15.3% today, including Medicare. Also, Retirement age is going up– See TAB 6. [In 84, Greenspan increases T, retire age.]**

C. Drag on Economy, Society - Tax's "unintended consequences.

*** Redistribution from young to old, blacks to whites!**

- **My won & others recent research using int'l panel data shows adverse effects on male-LFP, fertility, productivity growth, savings, and even net family formation. Why?**
- **"Moral Hazard": since benefits are divorced from contributions**
 - i. Incentive to retire early. In 1960: 77%v of 60 yrs old work. In 1997: only 55%. Implicit SS tax beyond 65 = 80%.**
 - ii. Workers lose some incentive be very productive.**
 - iii. Parents lose incentive to raise many productive kids & save.**
 - iv. Expect weakening of family. Marriage falls divorce rises!**

7. Illustrations:

- **Slowdown in g- rate of p/c income. – If World PEN stayed .0322 (not .056) 61-91, g would be 2.93, not 2.75%. [t=12.4% of payroll]**
- **In US, had SS tax been held at 1960 level, p/c income would have been higher by 3.3% in 91, and > 4% today.**
- **Note also that the adverse effects on savings & fertility along with possibly beneficial effects on longevity precipitate financial collapse of PAYG system. (See TAB B.1 in Ehrlich-Kim)**

8. Are we doomed?

- **Must reform PAYG, defined-benefits system to avoid real effects of the system on fertility, LFP, and human and physical-capital formation.**
- **Solution – must be in direction of provident funds a la approved system in HK and the operating system in Chile. Many Latin American countries are set to go in this direction. “Government is best which governs the least” (Thomas Jefferson).**
- **Rely on competitive market forces and workers’ power of choice. In Chile, annual rate of return to workers since privatization of system has been over 10% in real terms.**
- **Full funding and individual accounts, with strong safeguards and the government providing insurance of last resort will minimize adverse effects on the real economy and growth.**

9. Bottom Line: Answer to our \$64,000 Question:

- **Aging CAN BE A BLESSING**
- **We Must make sure PUBLIC POLICY DOESN'T TURN IT INTO A CURSE**

10.

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What are key dates in Long-Range OASI, DI, and HI Financing?

Below is a list of important future milestones.

- 2014 - First year OASDI outgo exceeds tax income
- 2015 - Year HI trust fund assets are exhausted
- 2020 - Year DI trust fund assets are exhausted
- 2022 - First year OASDI outgo exceeds tax plus interest income
- 2034 - Year combined OASDI trust funds' assets are exhausted
- 2036 - Year OASI trust fund assets are exhausted

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Table 1
Changes in Life Expectancy in the United States

	Year							Total Change	Annual Growth Rate (%)		
	<i>White Population</i> 1850*	1901	1950	1970	1990	1994	1997	1901-97	1901-97	1901-50	1950-97
At Birth											
Males	38.3	48.2	66.3	68.0	72.7	73.3	74.3	26.1	0.45	0.65	0.24
Females	40.5	51.1	72.0	75.6	79.4	79.6	79.9	28.8	0.47	0.70	0.22
At Age 20											
Males	40.1	42.2	49.5	50.3	54.0	54.4	55.3	13.1	0.28	0.33	0.24
Females	40.2	43.8	54.6	57.4	60.3	60.4	60.7	16.9	0.34	0.45	0.23
At Age 40											
Males	27.9	27.7	31.2	31.9	35.6	36.0	36.7	9.0	0.29	0.24	0.35
Females	29.8	29.8	35.6	38.3	41.0	41.1	41.3	11.5	0.34	0.36	0.32
<hr/>											
	<i>All Others</i>										
		1901	1950	1970		1996*		1901-96	1901-96	1901-50	1950-96
At Birth											
Males		32.5	58.9	61.3		66.1		33.60	0.75	1.21	0.25
Females		35	62.7	69.4		74.2		39.20	0.79	1.19	0.37
At Age 20											
Males		35.1	43.7	44.7		48		12.90	0.33	0.45	0.20
Females		36.9	46.8	52.2		55.7		18.80	0.43	0.49	0.38
At Age 40											
Males		23.1	27.3	28.6		31		7.90	0.31	0.34	0.28
Females		24.4	29.8	34.2		37.1		12.70	0.44	0.41	0.48

Source: *Historical Statistics of United States* for 1901-70; *Statistical Abstract of the United States* for others.

* State of Massachusetts only.

*Data for Black

Year Total					Total Change	Annual Growth Rate
	1980	1990	1994	1997	1980-97	1980-97
At Birth						
Males	70.1	71.8	72.4	73.6	3.5	0.29
Females	77.6	78.8	79.0	79.2	1.6	0.12
At Age 20						
Males	51.9	53.3	53.6	54.7	2.8	0.31
Females	59.0	59.8	59.9	60.1	1.1	0.11
At Age 40						
Males	33.6	35.1	35.5	36.2	2.6	0.44
Females	39.8	40.6	40.7	40.8	1.0	0.15

Source: Statistical Abstract of the United States.

Table 2

US Life Expectancy Trends by Age and Sex, 1901-95

	Age									
	0	5	10	20	30	40	50	60	70	80
Males										
Differences, '95-'01	24.62	14.08	12.91	11.77	9.84	7.95	6.30	4.77	3.38	2.09
Annual Growth Rate (%)										
1901-95	0.44	0.25	0.24	0.26	0.27	0.27	0.28	0.31	0.34	0.37
1901-50	0.64	0.31	0.30	0.31	0.28	0.22	0.18	0.19	0.25	0.33
1950-95	0.22	0.18	0.18	0.21	0.25	0.32	0.39	0.43	0.43	0.40
Females										
Differences, '95-'01	28.20	18.80	17.76	15.58	13.60	11.62	9.56	7.69	5.71	3.39
Annual Growth Rate (%)										
1901-95	0.47	0.31	0.31	0.32	0.34	0.36	0.39	0.44	0.50	0.51
1901-50	0.69	0.41	0.41	0.43	0.39	0.39	0.39	0.41	0.42	0.43
1950-95	0.23	0.20	0.21	0.21	0.28	0.33	0.38	0.46	0.58	0.60

Source: *United Nations Demographic Yearbook, Various Issues*

Table 3
US Birth Rate, 1800-1996

Year	Estimated Total Live Births (per 1,000)		Total Fertility Rate
	All	White	All
1800	n.a.	55	
1820	55.2	52.8	
1840	51.2	48.3	
1860	44.3	41.4	
1880	39.8	35.2	
1900	32.3	30.1	
1920	27.7	26.9	
1930	21.3	20.6	
1935	18.7	17.9	
1940	19.4	18.6	
1945	20.4	19.7	
1950	24.1	23	
1955	25	23.8	
1960	23.7	22.7	3.45
1965	19.4	18.3	2.62
1970	18.4	17.4	2.48
1975	14.6	13.6	1.77
1980	15.9	14.9	1.84
1985	15.8	14.8	1.84
1990	16.7	15.8	2.08
1992	15.9	15	2.06
1994	15.2	14.4	2.04
1995	14.8	14.2	2.02
1996	14.7	14.1	2.04
1997	14.6	NA	2.04
1998	14.6	NA	NA
1999	14.5	NA	NA

Table 4 US Health Care Expenditure

Year	Population (thousands)			GNP	Health Care Exp.		Public Expenditure		Private Expenditure		Medicare Expenses	
	Total	>=65	%	(bn US \$)	(Mn US \$)	% of GNP	(Mn US \$)	(% of GNP)	(Mn US \$)	(% of GNP)	(Mn US \$)	(% of GNP)
1935	127250	7804	6.13									
1940	132122	9031	6.84	94.7	3881	4.10	858	0.91	3023	3.19		
1945	139928	10494	7.50	213.7	7906	3.70	2571	1.20	5335	2.50		
1950	151684	12362	8.15	267.3	12027	4.50	3065	1.15	8962	3.35		
1955	165275	14489	8.77	385.1	17330	4.50	4421	1.15	12909	3.35		
1960	180671	16675	9.23	497.2	25856	5.20	6395	1.29	19461	3.91		
1965	194303	18451	9.50	659.2	38892	5.90	9535	1.45	29357	4.45		
1970	205052	20107	9.81	1018.9	74377	7.30	27792	2.73	46585	4.57	7500	0.74
1975	215973	22696	10.51	1538	132270	8.60	56180	3.65	76090	4.95	16317	1.06
1980	227757	25614	11.25	2736.9	249054	9.10	105159	3.84	143895	5.26	37533	1.37
1985	239729	28540	11.91	4000.6	420058	10.50	175063	4.38	244995	6.12	72052	1.80
1990	249907	31080	12.44	5764.9	697453	12.10	284309	4.93	413144	7.17	112091	1.94
1991	252618	31754	12.57	5392.4	761704	14.13	320295	5.94	441409	8.19	123017	2.28
1992	255391	32285	12.64	6255.5	836500	13.37	483600	7.73	352900	5.64	136200	2.18
1993	258132	32790	12.70	6576.8	898500	13.66	513200	7.80	385300	5.86	148700	2.26
1994	260682	33158	12.72	6955.2	947700	13.63	524900	7.55	422800	6.08	166900	2.40
1995	263168	33532	12.74	7287.1	993700	13.64	538500	7.39	455200	6.25	185200	2.54
1996	265557	33861	12.75	7674	1042500	13.58	561100	7.31	481400	6.27	200100	2.61
1997	268008	34075	12.71	8102.9	1092400	13.48	585300	7.22	507100	6.26	214600	2.65
1998	270561	34401	12.71	8490.5	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.

Source: Statistical Abstract of the United States, various years

Table 5 Economic Development and Demographics, 1998 (A)

<i>Rank</i> (by 1998 per capita GNP-206 economies)	<i>Country</i>	<i>Population</i> (millions)	<i>Per Capita GNP</i> (\$)	<i>TFR</i> births/woman	<i>Life Expectancy</i> <i>at Birth</i>
Low Income					
206	Ethiopia	61	100	6.4	43
195	Mozambique	17	210	5.2	45
195	Nepal	23	210	4.4	58
194	Tanzania	32	220	5.4	47
191	Burkina Faso	11	240	6.7	44
177	Zambia	10	330	5.5	43
173	Kenya	29	350	4.6	51
173	Vietnam	77	350	2.3	68
165	Mongolia	3	380	2.5	66
162	Haiti	8	410	4.3	54
161	India	980	440	3.2	63
158	Pakistan	132	470	4.9	62
156	Azerbaijan	8	480	2	71
145	China	1239	750	1.9	70

Table 5: Economic Development and Demographics, 1998 (B)

<i>Rank</i> (by 1998 per capita GNP- 206 economies)	<i>Country</i>	<i>Population</i> (millions)	<i>Per Capita GNP</i> (\$)	<i>TFR</i> (births/woman)	<i>Life Expectancy</i> <i>at Birth</i>
Middle Income					
139	Albania	3	810	2.5	72
139	Sri Lanka	19	810	2.1	73
135	Ukraine	50	980	1.3	67
132	Phillipins	75	1050	3.6	69
128	Jordan	5	1150	4.1	71
121	Egypt	61	1290	3.2	67
119	Romania	23	1360	1.3	69
111	Guatemala	11	1640	4.4	64
100	Thailand	61	2160	1.9	72
97	Russian	147	2260	1.2	67
93	Colombia	41	2470	2.7	70
85	Turkey	63	3160	2.4	69
83	South Africa	41	3310	2.8	63
81	Venezuela	23	3530	2.9	73
77	Slovak	5	3700	1.4	73
75	Mexico	96	3840	2.8	72
68	Brazil	166	4630	2.3	67
60	Saudi Arabia	21	6910	5.7	72
51	Korea	46	8600	1.6	73

Table 5: Economic Development and Demographics, 1998 (C)

<i>Rank</i> (by 1998 per capita GNP-206 economies)	<i>Country</i>	<i>Population</i> (millions)	<i>Per Capita GNP</i> (\$)	<i>TFR</i> (births/woman)	<i>Life Expectancy</i> <i>at Birth</i>
High Income					
32	Israel	6	16180	2.7	78
28	UAE	3	17870	3.4	75
26	Canada	30	19170	1.6	79
25	Italy	58	20090	1.2	78
22	United Kingdom	59	21410	1.7	77
21	Hong Kong	7	23660	1.1	79
20	France	59	24210	1.8	78
13	Germany	82	26570	1.4	77
10	United States	270	29240	2	77
9	Singapore	3	30170	1.5	77
7	Japan	126	32350	1.4	81
4	Norway	4	34310	1.8	78
3	Switzerland	7	39980	1.5	79

Source: World Bank, *World Development Report, 2000*

Table 2.A3. - Annual maximum taxable earnings and actual contribution rates, 1937-99 and thereafter

Year	Annual maximum taxable earnings		Contribution rate (percent)								
			Employer and employee, each				Self-employed person				
	OASDI	HI	Total	OASI	DI	HI	Total	OASI	DI	HI	
1937-49	\$3,000	...	1.0	1.0	...	...	...	...	...	...	...
1950	3,000	...	1.5	1.5	...	...	...	...	...	...	...
1951-53	3,600	...	1.5	1.5	...	...	2.25	2.25	...	...	...
1954	3,600	...	2.0	2.0	...	...	3.0	3.0	...	...	...
1955-56	4,200	...	2.0	2.0	...	...	3.0	3.0	...	...	...
1957-58	4,200	...	2.25	2.0	0.25	...	3.375	3.0	0.375	...	...
1959	4,800	...	2.5	2.25	.25	...	3.75	3.375	.375	...	...
1960-61	4,800	...	3.0	2.75	.25	...	4.5	4.125	.375	...	...
1962	4,800	...	3.125	2.875	.25	...	4.7	4.325	.375	...	...
1963-65	4,800	...	3.625	3.375	.25	...	5.4	5.025	.375	...	...
1966	6,600	\$6,600	4.2	3.5	.35	0.35	6.15	5.275	.525	0.35	...
1967	6,600	6,600	4.4	3.55	.35	.5	6.4	5.375	.525	.5	...
1968	7,800	7,800	4.4	3.325	.475	.6	6.4	5.0875	.7125	.6	...
1969	7,800	7,800	4.8	3.725	.475	.6	6.9	5.5875	.7125	.6	...
1970	7,800	7,800	4.8	3.65	.55	.6	6.9	5.475	.825	.6	...
1971	7,800	7,800	5.2	4.05	.55	.6	7.5	6.075	.825	.6	...
1972	9,000	9,000	5.2	4.05	.55	.6	7.5	6.075	.825	.6	...
1973	10,800	10,800	5.85	4.3	.55	1.0	8.0	6.205	.795	1.0	...
1974	13,200	13,200	5.85	4.375	.575	.9	7.9	6.185	.815	.9	...
1975	¹ 14,100	¹ 14,100	5.85	4.375	.575	.9	7.9	6.185	.815	.9	...
1976	¹ 15,300	¹ 15,300	5.85	4.375	.575	.9	7.9	6.185	.815	.9	...
1977	¹ 16,500	¹ 17,700	5.85	4.375	.575	.9	7.9	6.185	.815	.9	...
1978	¹ 17,700	¹ 17,700	6.05	4.275	.775	1.0	8.1	6.01	1.09	1.0	...
1979	22,900	22,900	6.13	4.33	.75	1.05	8.1	6.01	1.04	1.05	...
1980	25,900	25,900	6.13	4.52	.56	1.05	8.1	6.2725	.7775	1.05	...
1981	29,700	29,700	6.65	4.7	.65	1.3	9.3	7.025	.975	1.3	...
1982	¹ 32,400	¹ 32,400	6.7	4.575	.825	1.3	9.35	6.8125	1.2375	1.3	...
1983	¹ 35,700	¹ 35,700	6.7	4.775	.825	1.3	9.35	7.1125	.9375	1.3	...
1984	¹ 37,800	¹ 37,800	² 7.0	5.2	.5	1.3	² 14.0	10.4	1.0	2.6	...
1985	¹ 39,600	¹ 39,600	7.05	5.2	.5	1.35	² 14.1	10.4	1.0	2.7	...
1986	¹ 42,000	¹ 42,000	7.15	5.2	.5	1.45	² 14.3	10.4	1.0	2.9	...
1987	¹ 43,800	¹ 43,800	7.15	5.2	.5	1.45	² 14.3	10.4	1.0	2.9	...
1988	¹ 45,000	¹ 45,000	7.51	5.53	.53	1.45	² 15.2	11.06	1.06	2.9	...
1989	¹ 48,000	¹ 48,000	7.51	5.53	.53	1.45	² 15.2	11.06	1.06	2.9	...
1990	³ 51,300	³ 51,300	7.65	5.6	.6	1.45	15.3	11.2	1.2	2.9	...
1991	³ 53,400	⁴ 125,000	7.65	5.6	.6	1.45	15.3	11.2	1.2	2.9	...
1992	³ 55,500	⁴ 130,200	7.65	5.6	.6	1.45	15.3	11.2	1.2	2.9	...
1993	¹ 57,600	¹ 135,000	7.65	5.6	.6	1.45	15.3	11.2	1.2	2.9	...
1994	¹ 60,600	(5)	7.65	5.26	.94	1.45	15.3	10.52	1.88	2.9	...
1995	¹ 61,200	(5)	7.65	5.26	.94	1.45	15.3	10.52	1.88	2.9	...
1996	¹ 62,700	(5)	7.65	5.26	.94	1.45	15.3	10.52	1.88	2.9	...
1997	¹ 65,400	(5)	7.65	5.35	.85	1.45	15.3	10.7	1.7	2.9	...
1998	¹ 68,400	(5)	7.65	5.35	.85	1.45	15.3	10.7	1.7	2.9	...
1999	¹ 72,600	(5)	7.65	5.35	.85	1.45	15.3	10.7	1.7	2.9	...
Future schedule: 2000 and thereafter	(1)	(5)	7.65	5.3	.9	1.45	15.3	10.6	1.8	2.9	...

(1) Based on automatic adjustment, under 1972a Act (as modified by 1973a and 1973b Acts), in proportion to increases in average wage level

(2) Includes tax credit, see table 2.A5

(3) Based on automatic adjustment, under 1972a Act (as modified by 1973a and 1973b Acts), using a transitional rule, specified by the Omnibus Budget Reconciliation Act (OBRA) of 1989, for computing a "deemed" average annual wage for 1988, 1989 and 1990

(4) Based on 1990 legislation

(5) Upper limit on earnings subject to HI taxes was replaced by OBRA 1993

Table B.1. Impact of Hypothetical Tax Reductions: Projections for the World and US Economies

	(1) Actual mean 1961-91 Actual 1960 value	(2) Actual 1991 value	(3) Reducing the sample mean tax rate 10% ¹ From .056 to .054	(4) Reducing the sample mean tax rate 25% ¹ From .056 to .042	(5) Going back to the 1960 tax rate ¹ From .056 to .0322
WORLD					
Per Capita GDP Growth	2.75 %		2.78 %	2.84 %	2.93 %
Per Capita GDP	\$4,387	\$10,160	\$10,264	\$10,452	\$10,739
Yrs of Schooling Growth	1.21 %		1.22 %	1.25 %	1.28 %
Years of Schooling ²	5.25	7.09	7.11	7.16	7.22
Total Fertility Rate	2.81		2.97	3.23	3.57
Net Marriage Rate	0.84		0.90	1.02	1.16
Marriage Rate	1.01		1.05	1.12	1.21
Divorce Rate	0.17		0.15	0.13	0.11
Private Saving Rate	25.94		26.09	26.32	26.58
U.S.					
Per Capita GDP Growth	1.87 %		1.90 %	1.96 %	1.98 %
Per Capita GDP	\$9,895	\$17,594	\$17,734	\$18,061	\$18,171
Yrs of Schooling Growth	1.24 %		1.26 %	1.30 %	1.31 %
Years of Schooling ²	8.67	11.8	11.9	12.0	12.1
Total Fertility Rate	2.17		2.18	2.21	2.22
Net Marriage Rate	0.81		0.88	1.00	1.05
Marriage Rate	1.34		1.41	1.53	1.58
Divorce Rate	0.53		0.52	0.51	0.50
Private Saving Rate	21.08		21.23	21.47	21.56

Projections for the "world" are based on regression coefficients estimated for the FULL set of the relevant endogenous variable. Projections for the US are based on the regression coefficients estimated for the RICH set of the relevant regression models.

Projections of per capita GDP and its growth rate are based on the estimated regression coefficients in Model 2 of Table 5.

Projections of years of schooling and its growth rate are based on the estimated coefficients in the Ln(SCHYR) regression of Table 4.

Projections of total fertility rates are based on the estimated coefficients in Model 2 of Table 2.

Projections of family formation variables are based on the estimated regression coefficients in Table 1.

Projections of private saving rates are based on the estimated regression coefficients in Table 3, but excluding NETMARRY as a regressor (not reported in Table 3).

1. Average tax rate, as approximated by $PEN = \text{Pension benefits}/GDP$

2. The end-period for this variable is 1985. The regression estimates are derived from the relevant sub-samples, ending in 1985.