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Workshop on

"Money, Finance and Banking in East Asia"

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5-6 December 2011

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University of Notre Dame and NBER

Presentation to

"Demographic Patterns and Household Saving in China"

Demographic Patterns and Household Saving in China

Chadwick Curtis, Steven Lugauer and Nelson Mark.

Deutsche Bundesbank Workshop on Money, Finance and Banking in East Asia 12/5-6/2011

The Problem

1. To understand evolution of household saving rate in China over time (1
2. Income and Demographics and Chinese Household Saving
3. The Data
4. An OLG Model of Saving

Features

- China's household saving rate is one of the highest in the world and growing. (27 percent in 2008).
- Exhibits large variation over time: (3.9 percent before 1977).
- Funds investment as engine of growth
- Contributes to current account surplus
- Effective strategies for rebalancing growth requires us to understand what drives the saving rate

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China's Rise in the World Economy

Table 2: Share of output. Source PWT7.0

Year	USA	Japan	Germany	China
1978	0.57	0.22	0.16	0.05
1984	0.55	0.22	0.15	0.08
1990	0.53	0.23	0.14	0.10
1995	0.51	0.21	0.13	0.15
2001	0.51	0.18	0.12	0.18
2005	0.49	0.16	0.10	0.24
2008	0.46	0.15	0.10	0.29
2009	0.44	0.14	0.09	0.32

Investment Shares

Table 3: Investment share of GDP

Average of previous 5 years				
	USA	Germany	Japan	China
1985	20.8	24.4	29.1	39.2
1990	19.8	24.2	30.5	37.3
1995	17.8	22.8	29.8	40.4
2000	20.1	21.4	26.8	37.4
2005	19.3	17.6	23.5	40.1
2010	17.8	17.7	22.3	45.2

Composition of Gross National Saving

Table 5: Composition of China's saving. Source: Ma and Yang, 2009.

	Share of GDP	Share of National Saving			Household
	Gross Saving	Govt	Corp	Household	Saving Rate
1995	38	7	42	51	17
2000	37	9	44	49	23
2001	38	11	46	43	24
2002	40	13	45	43	23
2003	44	16	42	42	24
2004	47	10	50	40	24
2005	48	13	42	45	23
2006	50	18	38	44	25
2007	52	21	36	43	26
2008	53	21	35	44	27

Income Growth–Mixed results

- Kraay (2000): Rural saving rate falls with expectations of higher future income growth.
- Modigliani and Cao (2004): Saving rate increases with long-term growth rate and with the deviation from long-run growth rate.
- Horioka and Wan (2006): Saving rate increases with provincial per capita income growth.
- Puzzling? Does life-cycle theory predict lower saving with higher growth to smooth consumption over the life-cycle?

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Demographic Factors–Mixed Evidence

- Saving rate should increase in response to: Decline in youth dependency, expected future increase in old-age dependency, decline in today's old-age dependency.
- Kraay (2000): No effect.
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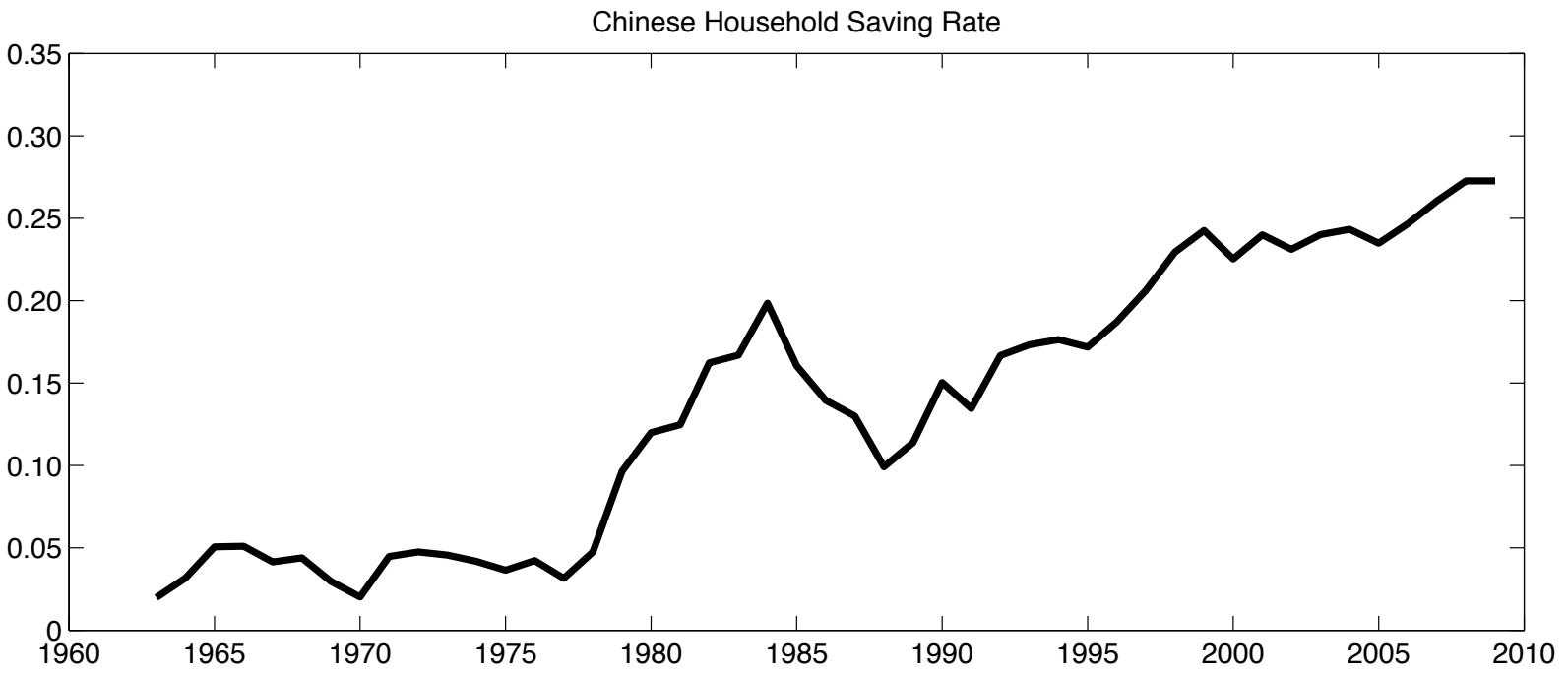
China's Influence on the ROW

Fehr, Joskisch and Kotlikoff (2007)

The data



- Chinese household saving rate: Modigliani and Cao (2004) + China Statistical Yearbook.

Demographics

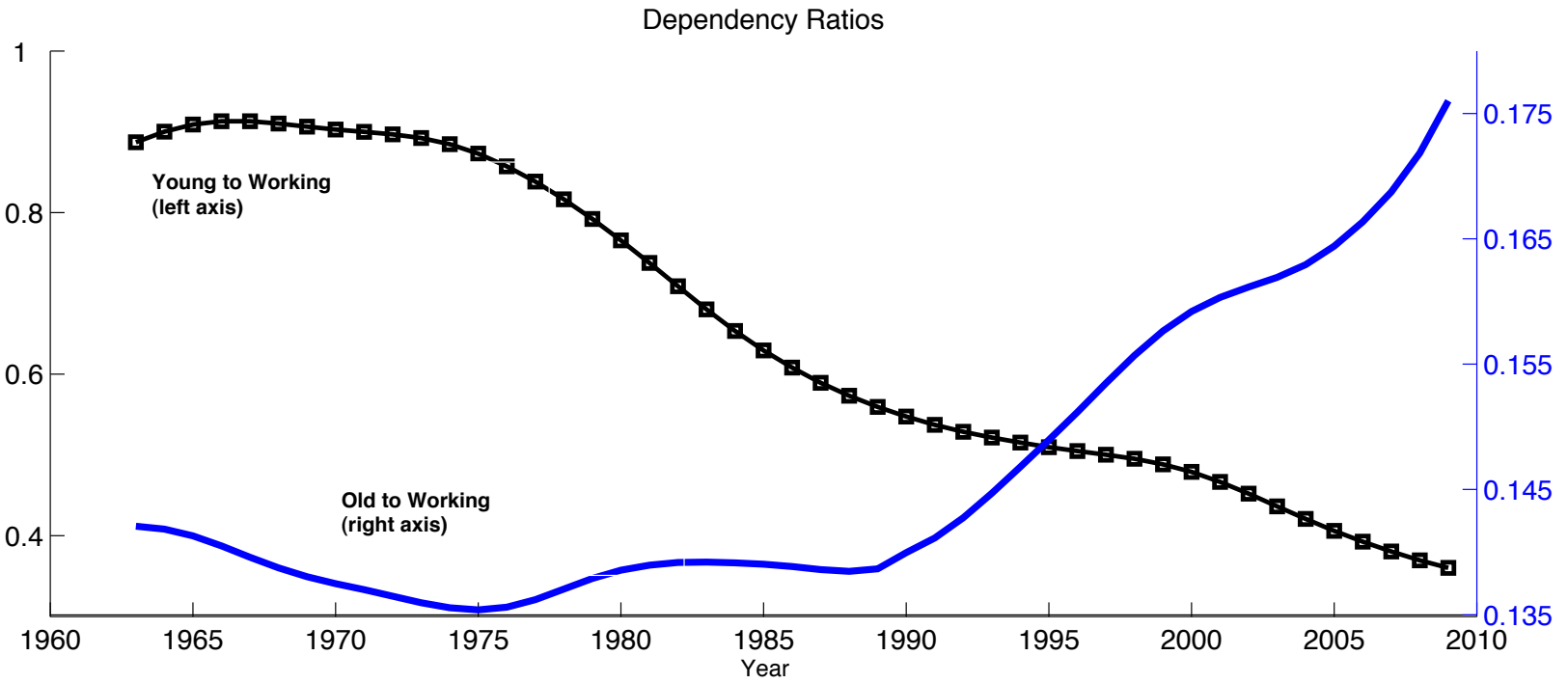
- Historical + projected demographics: United Nations World Population Prospects.
- China's demographic landscape has undergone dramatic change
- Exogenous decline in fertility due to enforcement of the one-child policy.

Decline in Fertility

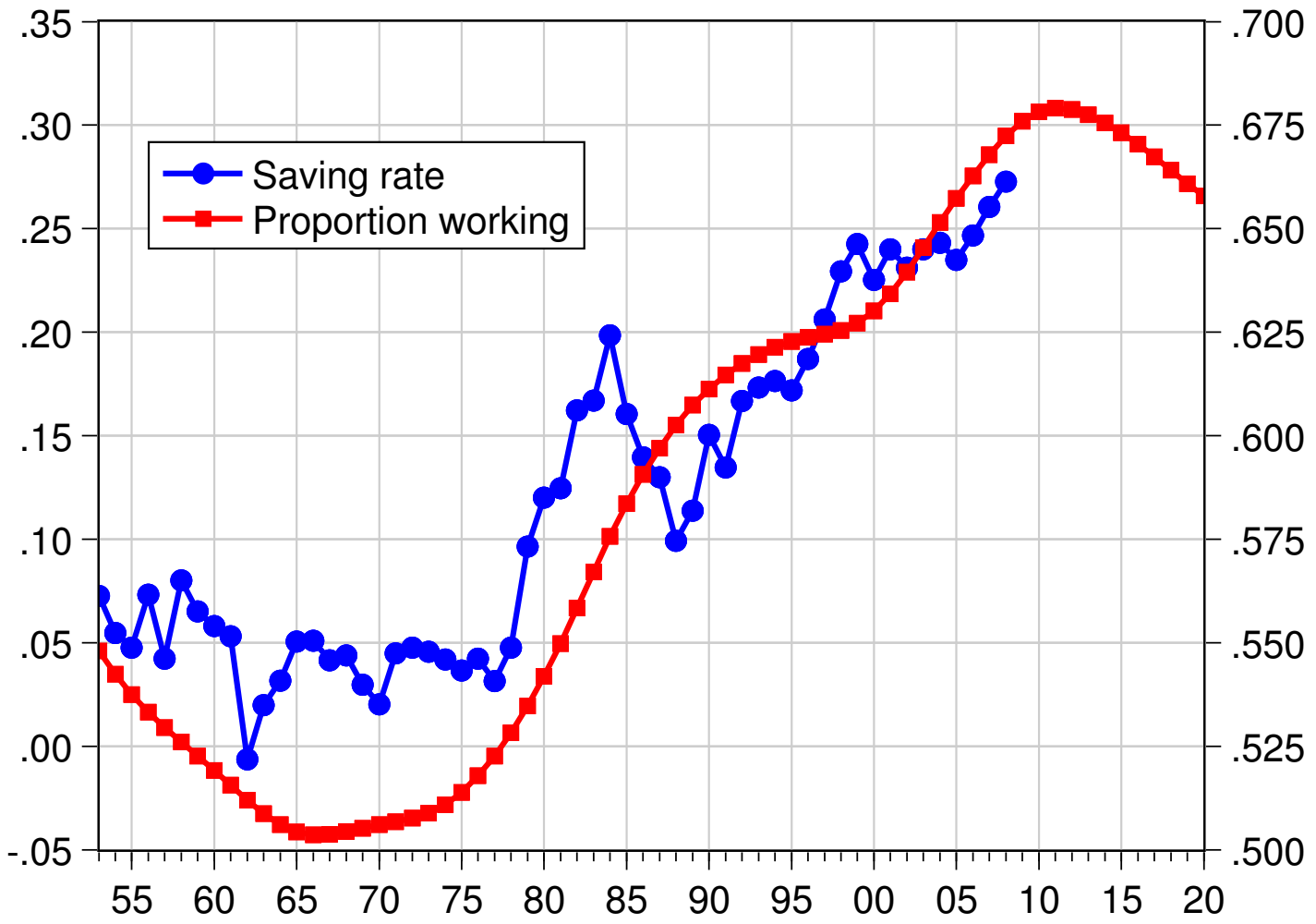
Table 6: Total Fertility Rates

Year	China	USA
1950-54	6.1	3.4
1970-74	4.8	1.8
1975-79	2.9	1.8
1990-94	1.8	2.0
2005-09	1.8	2.1

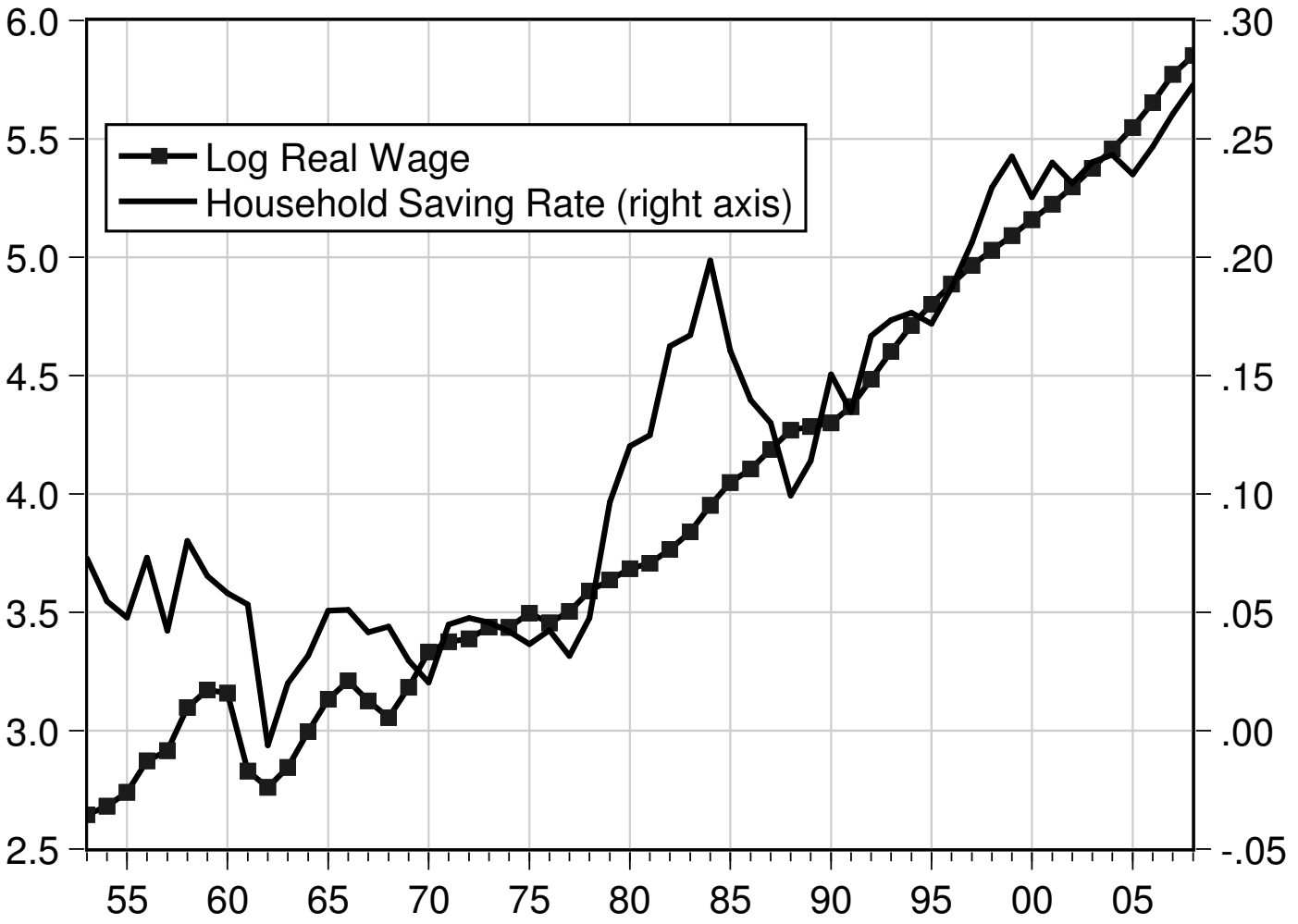
Variation in Dependency Ratios



Changing demographic composition



Real Wage Growth



Take-aways from the data

- Household saving should be increasing in
  1. exogenous reductions in family size due to relaxation on budget constraint and fewer children to provide for in old age.
  2. an increase in the proportion of working age people because they are the savers.
  3. lower expected income growth (?)
- Over the sample, demographics and income growth work in opposite directions
  - Pre-reform era: Low income growth (high saving) and relatively large household size (low saving).
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Model Features

- People live 85 years. Those aged 18 to 85 make decisions
- Stages of life: Children (age 0 to 17), parents (age 18 to 47), workers (age 18 to 63), adult children (age 45 to 65), and retirees (age 64 to 85).
- Parental and childrenís consumption enter separately into parental utility, as in Barro and Becker (1989). More spending on children make parents happier (altruistic parents) but also cuts into budget constraint.
- People work and support aging parents from ages 18 to 63
- People retire at 64, live off of accumulated assets and transfers from working aged children until they die at 85. 85 year olds have bequest motive. Bequest spread across adult aged (45 to 65) children

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The various cohorts

Households with children

- $$u_t^i\left(c_t^{c,i}, c_t^i\right) = \mu\left(n_t^c\right)^\eta \left(\frac{\left(c_t^{c,i}\right)^{1-\sigma} - 1}{1-\sigma}\right) + \left(\frac{\left(c_t^i\right)^{1-\sigma} - 1}{1-\sigma}\right),$$
- $n_t^c c_t^{c,i} + c_t^i + a_{t+1}^{i+1} = (1-\tau_t)w_t + (1+r_t)a_t^i + B_t^i \ , \qquad i \in [18, 47.$

Discount Factor

Effective Discount Rate for Households with Children

$$U_t = \sum_{j=0}^{30} \widehat{\beta}_j \frac{c_{t+j}^{j+18}}{1-\sigma}$$

where $\widehat{\beta}_j$ *is the effective discount rate, such that*

$$\widehat{\beta}_j = \beta^j \left(1 + [\mu n_{t+j}^{-(\sigma^2-2\sigma+1-\eta)}]^{1/\sigma}\right)$$

is decreasing in n_{t+j} *if* $\sigma < 1-\sqrt{\eta}$ *or if* $\sigma > 1+\sqrt{\eta}$.

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Working empty nest

- $$u_t^i\left(c_t^i\right) = \left(\frac{\left(c_t^i\right)^{1-\sigma} - 1}{1-\sigma}\right),$$
- $c_t^i + a_{t+1}^{i+1} = (1-\tau_t)w_t + (1+r_t)a_t^i + B_t^i, \qquad i \in [48, 63],$

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Quantitative Exercise

- Households take wages, interest rates, and demographic variations as exogenous.
- Present to households the data on these variables, and see if we can get them to save like they do in the data.

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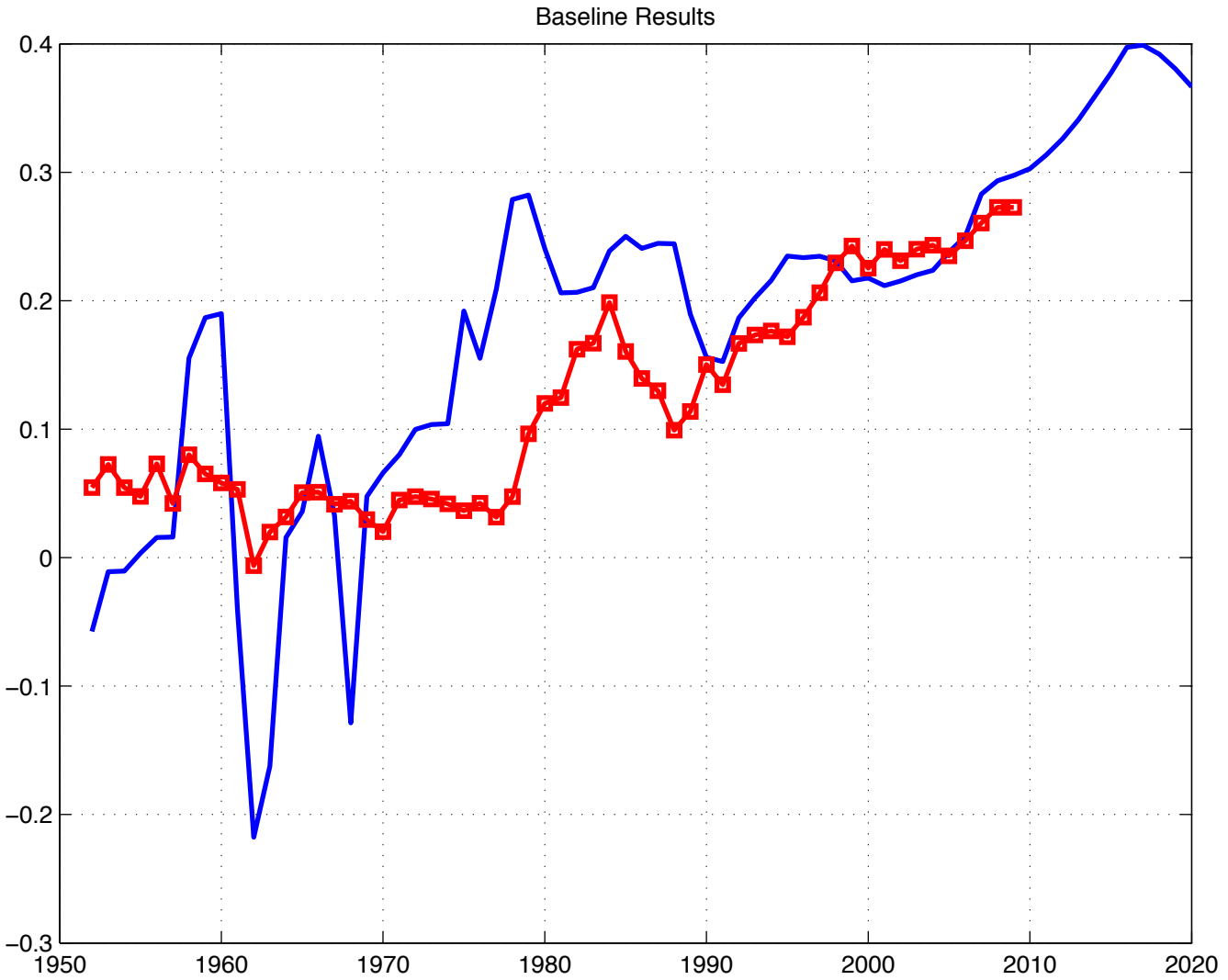
Parameterization

Table 4: Baseline parameterization

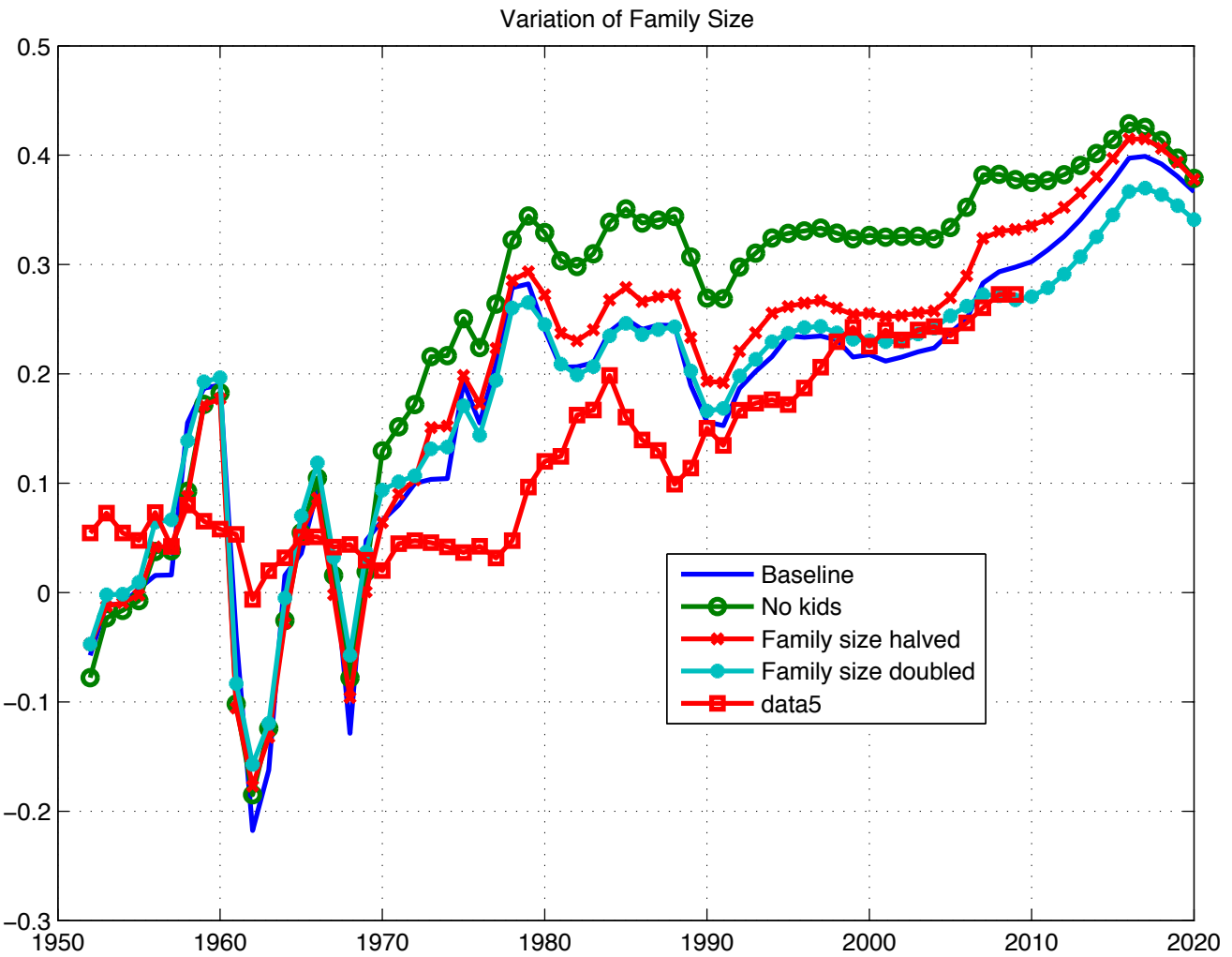
Parameter		Symbol	Value
weight on children		μ	0.65
concavity for children		η	0.76
labor's share of output	pre-reforms	$(1-\alpha)$	0.60
	post-reforms		0.40
transfer share	pre-reforms	τ	0.12
	post-reforms		0.05
discount rate		β	0.99
coef. of relative risk aversion		σ	1.90
depreciation rate		δ	0.10

μ, η :Manuelli-Seshadri. α :Hu-Khan, Hsieh-Klenow. τ :Lee-Xiao

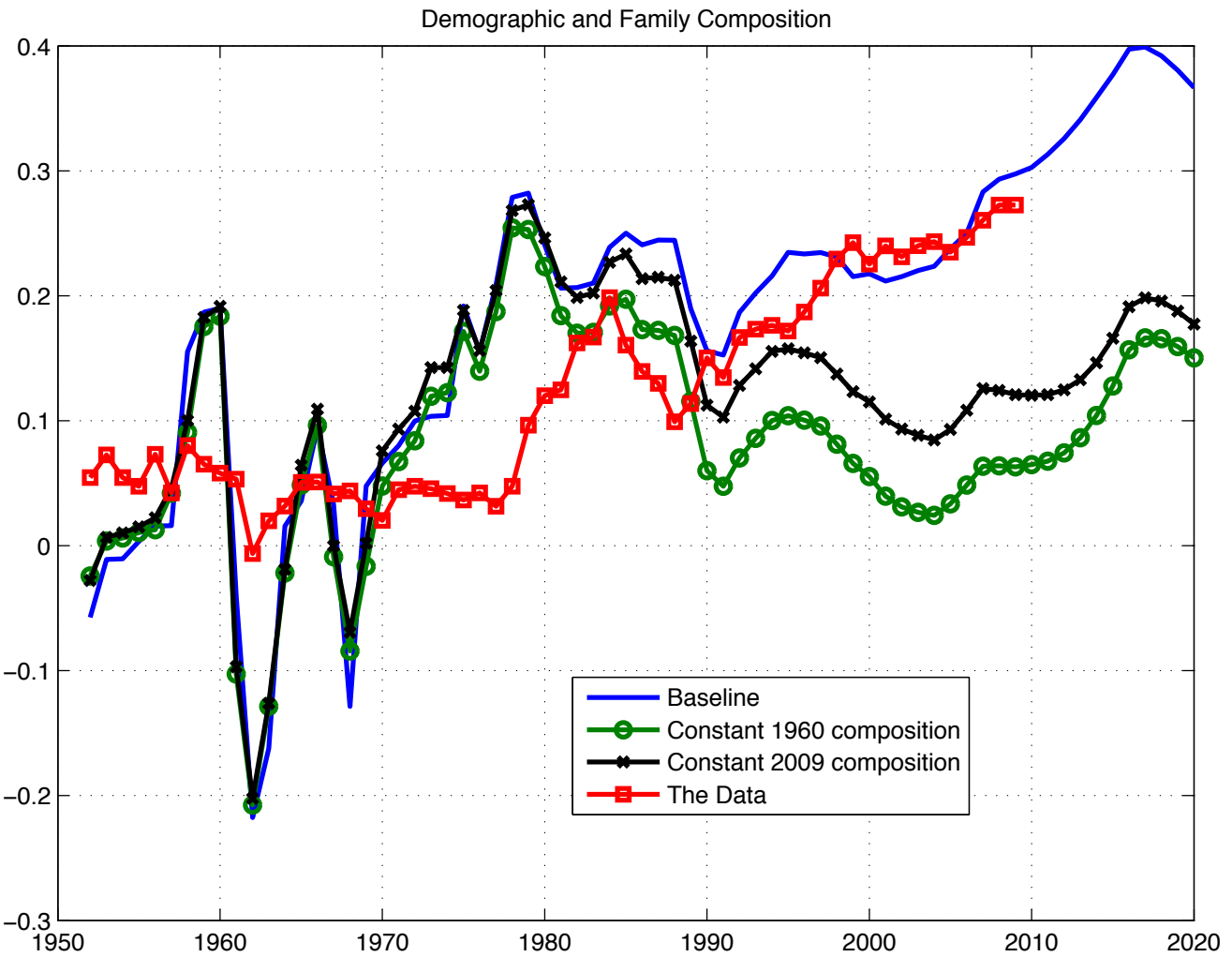
Baseline Results



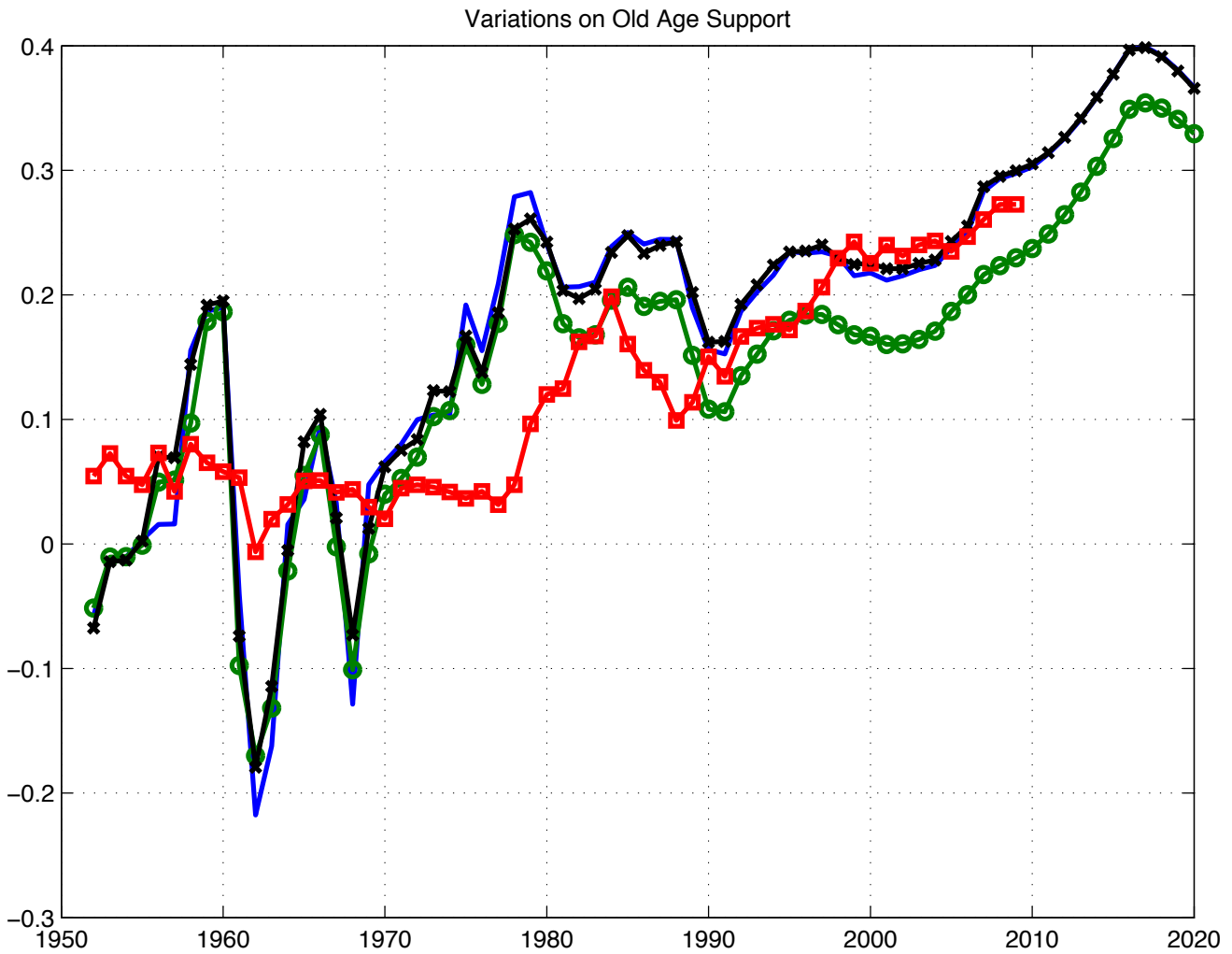
Family Size


Variation of Family Size
0.5
0.4
0.3
0.2
0.1
0
−0.1
−0.2
−0.3
1950
1960
1970
1980
1990
2000
2010
2020
Baseline
No kids
Family size halved
Family size doubled
data5

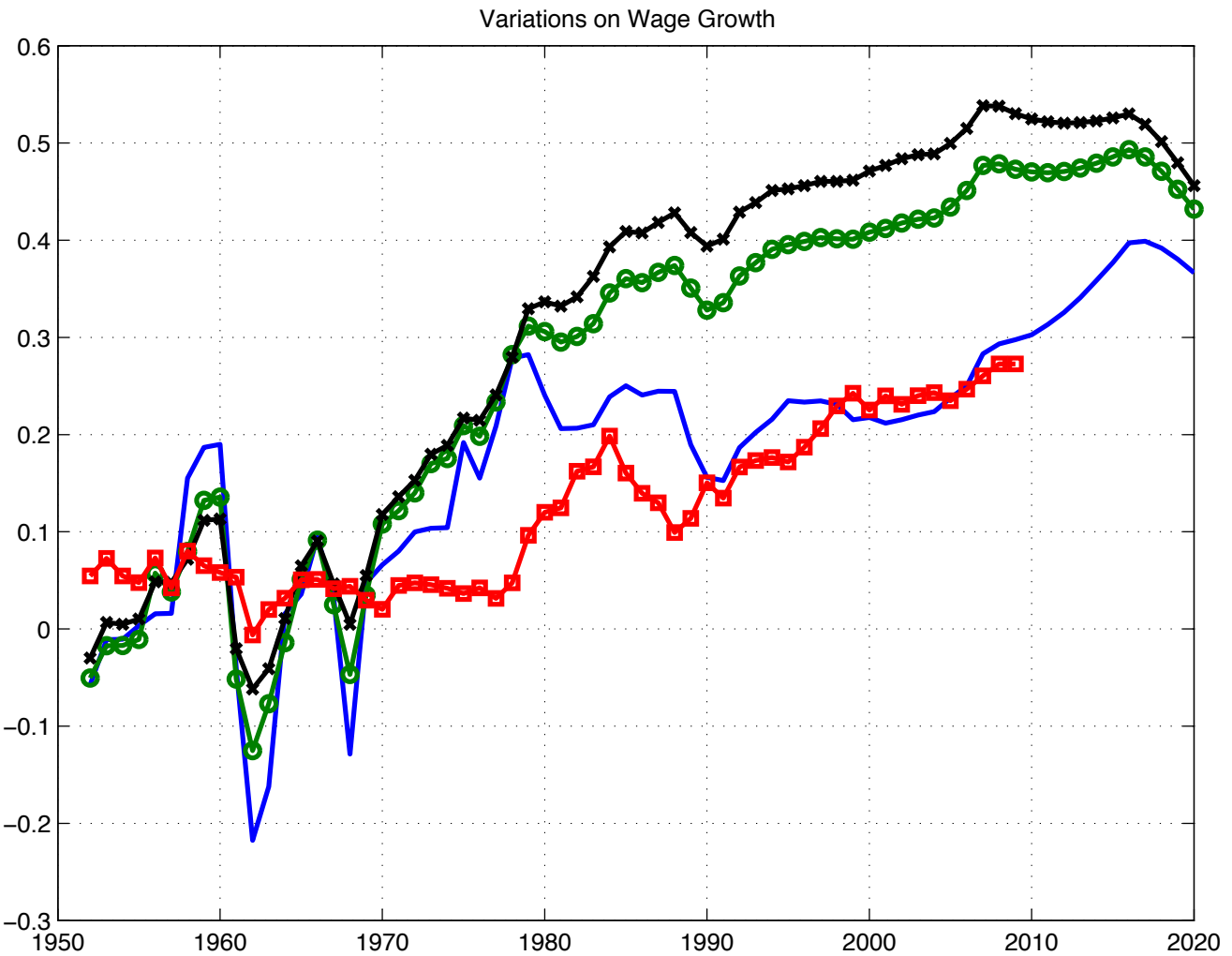
Constant Demographic and Family Composition



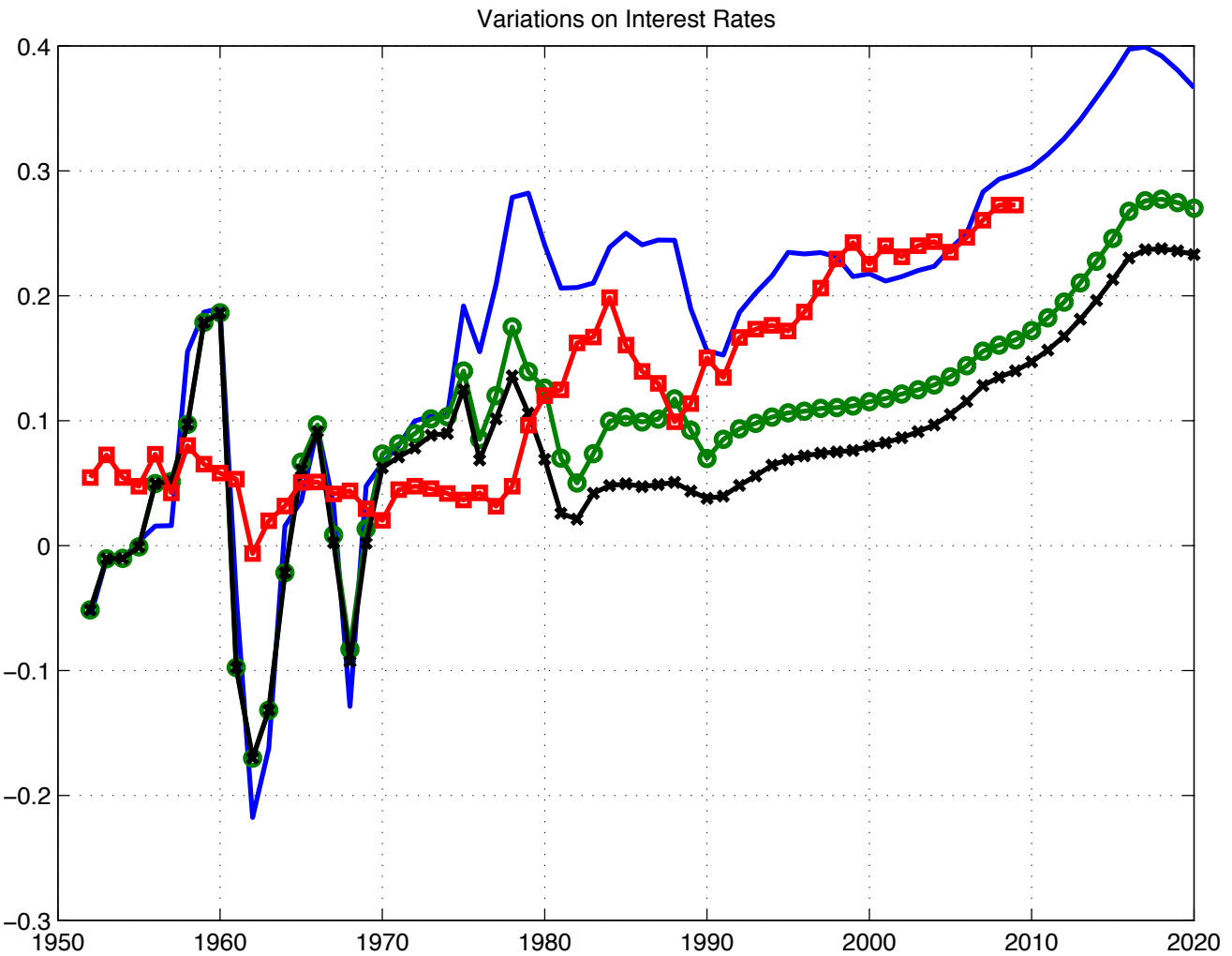
Old Age Support



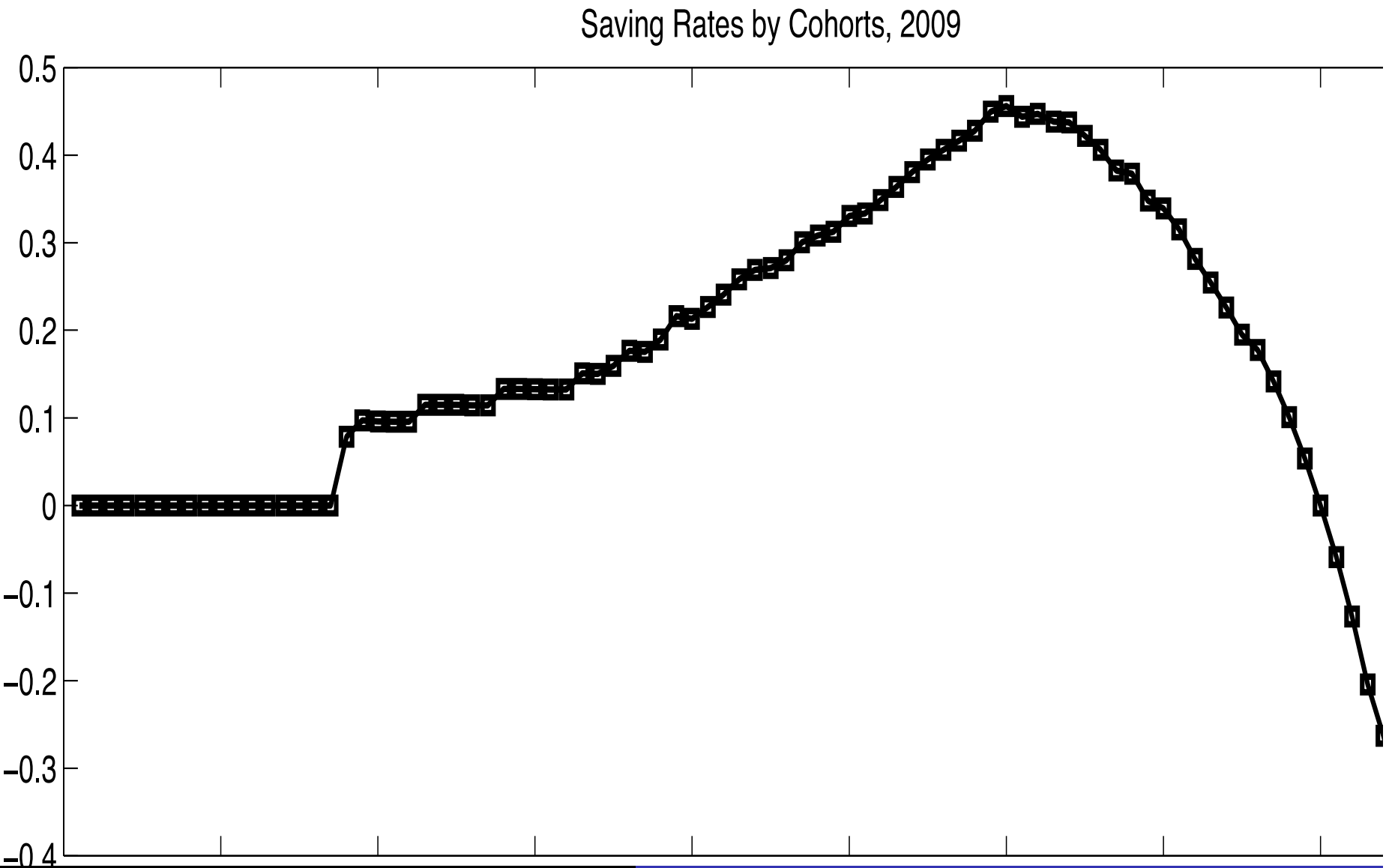
Variations on Wage Growth



Variations on Interest Rate



Saving by cohort



Conclude

- It is possible to write down a model of Chinese households and to get them to save a large fraction of income.
- Using a deterministic model, standard life-cycle considerations go a long way in explaining the evolution of household saving in China.
- Family size matters
- Expected growth rate of labor income matters

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