Household Saving, Financial Constraints, and the Current Account Balance in China

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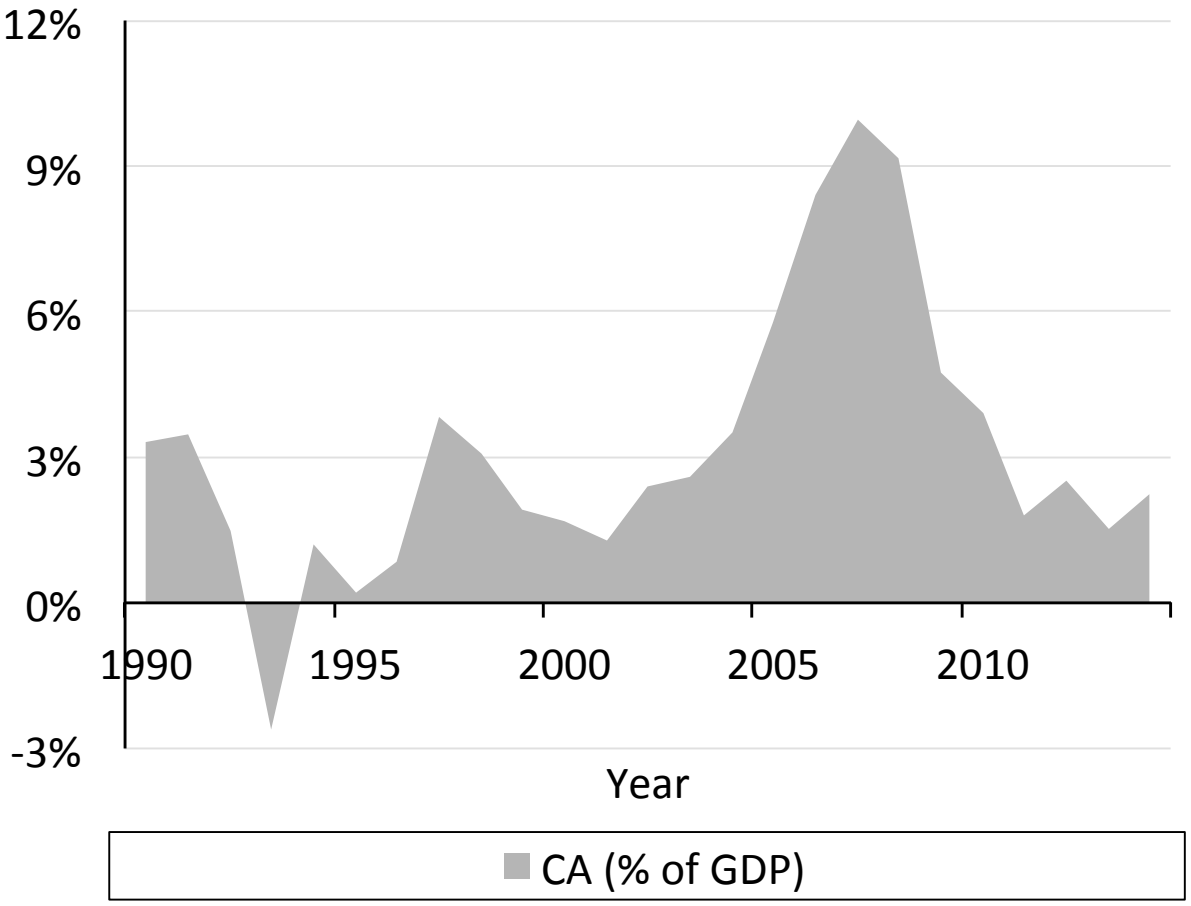
Facing Demographic Change in a Challenging Economic Environment- Montreal

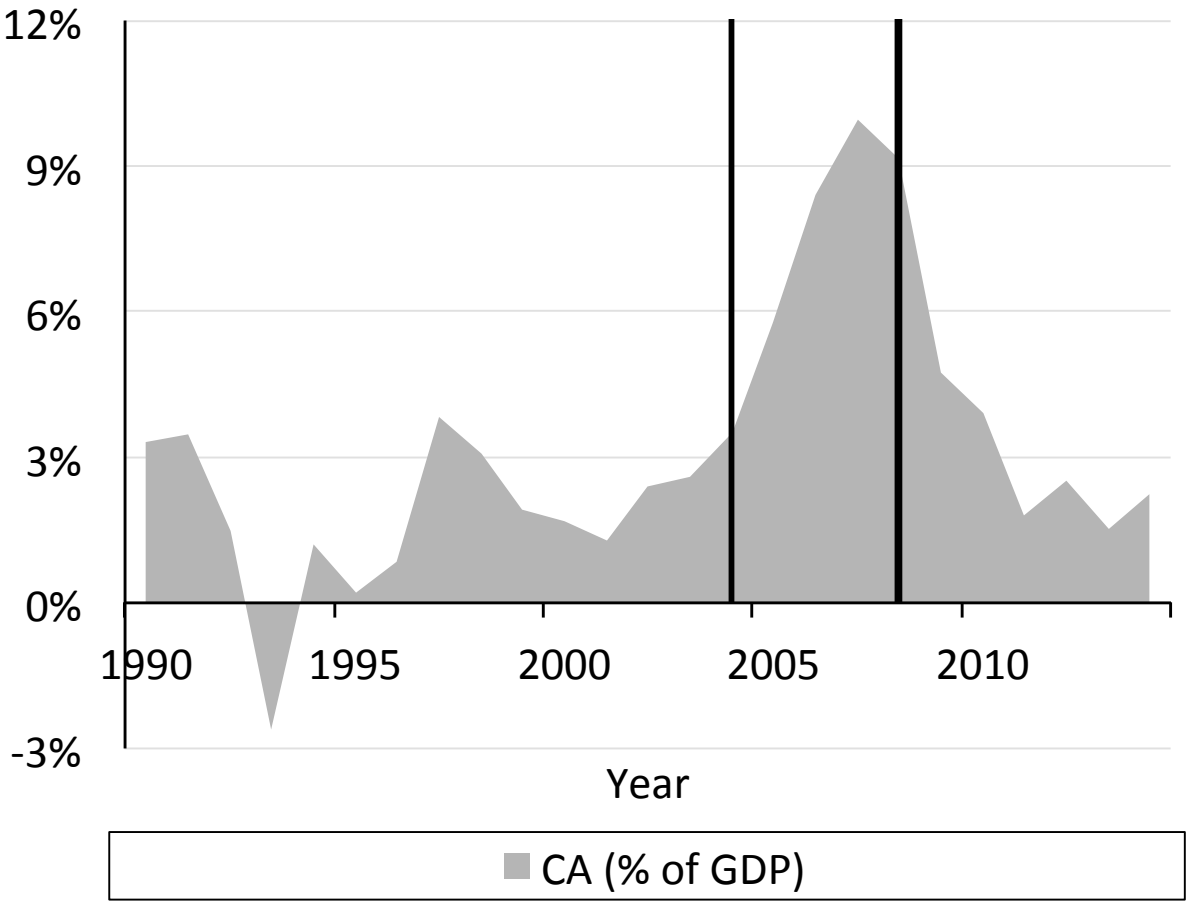
Current Account in China

Figure 1: Current Account % GDP



Current Account in China

Figure 2: Current Account % GDP



Current Account Balance

Global imbalances: Mendoza, Quadrini, and Rios-Rull (2009); Caballero, Farhi, and Gourinchas (2008), Gourinchas and Jeanne (2013)

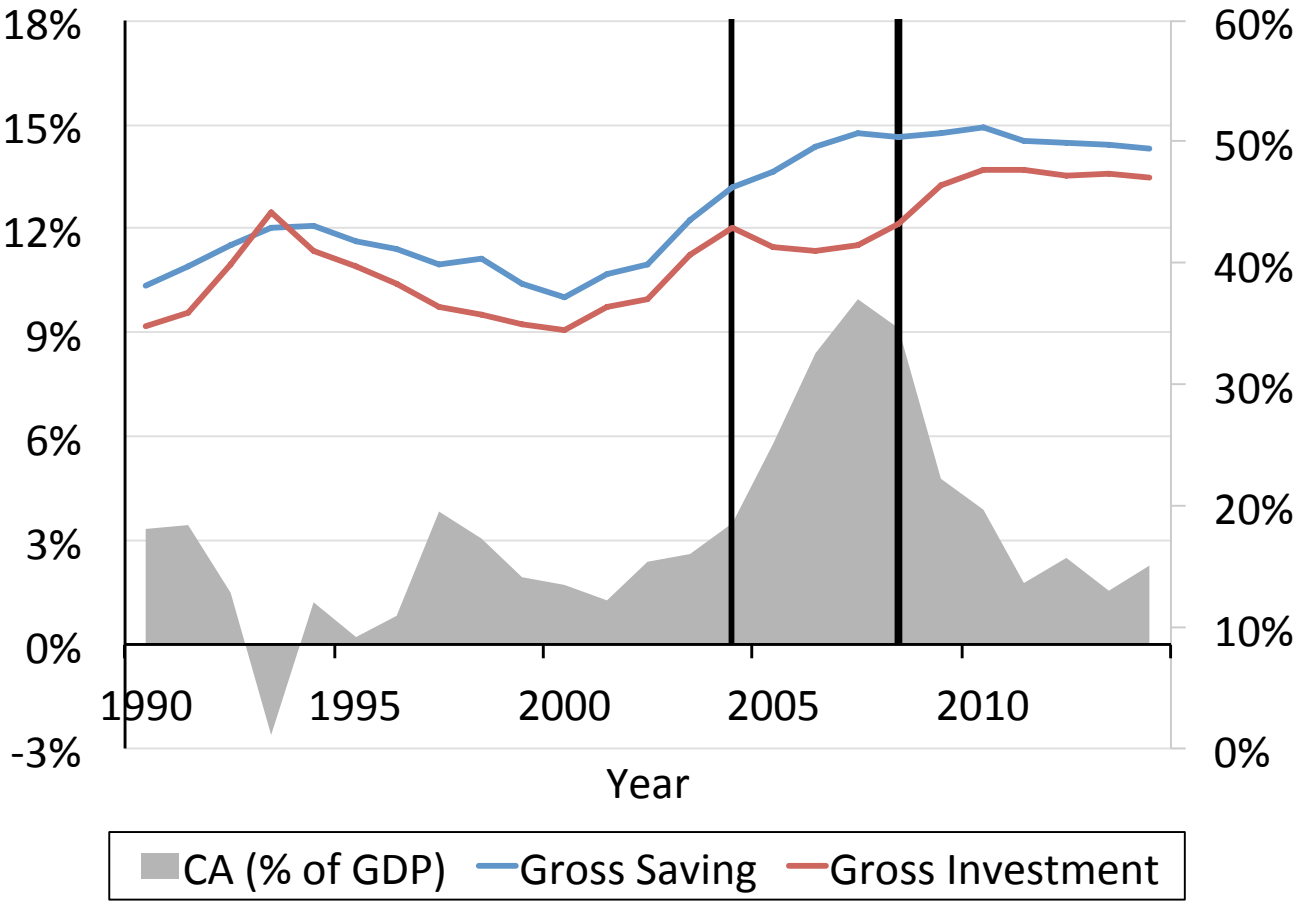
China in particular: Song, Storesletten, and Zilibotti (2011); Coeurdacier, Guibaud, and Jin (2015)

In this paper

- Goal of this paper: Develop a model with
  - Saving (İmrohoroğlu and Zhao (2017))
    - Households
    - Corporations
    - Government
  - Investment
  - Borrowing Constraints

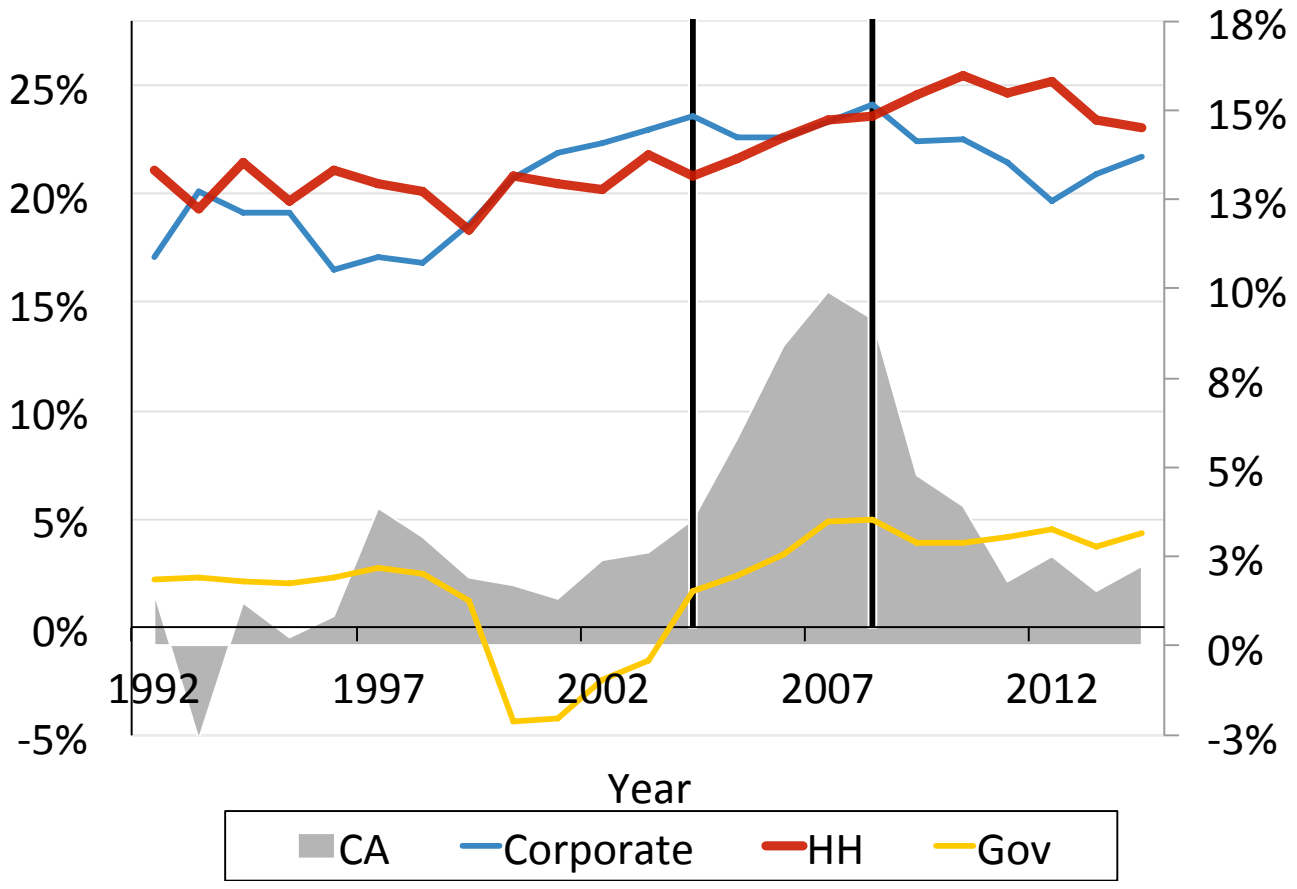
Current Account in China

Figure 3: Current Account, Saving, and Investment % GDP



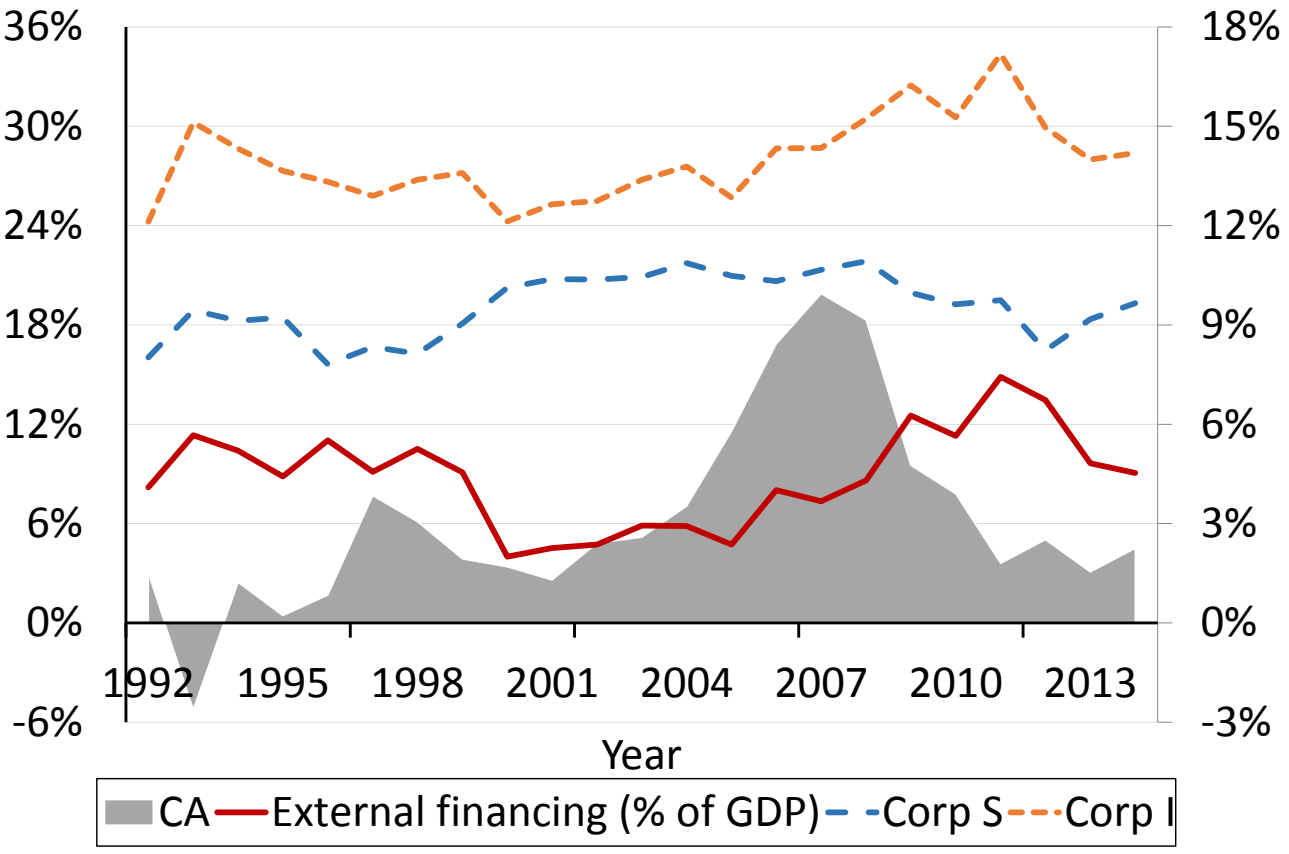
Current Account in China

Figure 4: Corporate, HH, and Gov Saving % GDP



Current Account in China

Figure 5: Corp Saving, Investment, and External Financing



Our study

- Altruistic households as in İmrohoroğlu and Zhao (2017)
- Individuals face
  - Labor income risk when young
  - Health risk when old
- Family insurance

Our study

- Corporate sector: composed of firms that are owned by a fraction of households who have entrepreneurial skills
  - They are highly productive but face borrowing constraints
  - Calibrate the borrowing constraints to match the external funding used by Chinese firms
- Owners of the firms enjoy high returns due to high productivity

Our study

- Most of the household savings earn the bank deposit rate that is determined in a competitive banking sector which equals the rate of return on foreign bonds
- Financial frictions restrict the amount of funds that can be allocated to the domestic firms
- Banks simply invest the difference between domestic savings and loans to domestic firms in foreign funds which results in a current account surplus for the country
- Government also saves the government surplus in the domestic banking system

The Model Environment

- A general equilibrium model with two-sided altruism (Laitner (1992), Fuster, İmrohoroğlu, and İmrohoroğlu (2003 and 2007))
- Decision-making unit is the household consisting of a parent and n children who pool resources together
- Life cycle of an individual (i.e., 70 periods):
  - born at age 20,
  - become parents (of 20 year old kids) at real-age 55,
  - retire at age 60, and
  - live up to age 90.
- An individual's life overlaps with his parent's in the first T (35) periods and with the life of his children in the last T periods

Households

- Individuals face idiosyncratic labor income risks (μ_j)
- Parents face health related risks that necessitate long-term care
  - $h = 0$: healthy parent without LTC needs;
  - $h = 1$: parent with LTC needs.
  - time cost ξ and goods cost m.
- Family labor income

$$e_j = \begin{cases} w\varepsilon_j\mu_j(n - \xi h) + w\varepsilon_{j+T}(1 - h)(1 - \tau_{ss}) & \text{if} \quad j + T < R \\ \\ w\varepsilon_j\mu_j(n - \xi h)(1 - \tau_{ss}) + dSS & \text{if} \quad j + T > R. \end{cases}$$

Entrepreneurial Families

- A fraction ω of families own the firms
- Receive the profits of the firms
- The entrepreneurial family with own assets a will solve the profit maximization problem

$$\pi^f(a) = \max_{N,I} AK^{\alpha}N^{1-\alpha} - \delta K - wN - r^I I$$

- subject to the incentive-compatibility constraint

$$(1 + r^I)I \leq \eta[AK^{\alpha}N^{1-\alpha} + (1 - \delta)K - wN]$$

$$\text{and } K = a + I$$

Entrepreneurial Families

- Profit maximization yields wage

$$w = (1 - \alpha)A(K/N)^{\alpha}$$

- and return to capital

$$\rho = \alpha A(K/N)^{\alpha - 1} - \delta$$

- and the level of the loan

$$l = \frac{\eta(1 + \rho)}{1 + r^l - \eta(1 + \rho)} a \tag{1}$$

Entrepreneurial Families

$$V_j(x) = \max_{c_s, c_f, a'} [nu((1-\tau_c)c_s) + du((1-\tau_c)c_f)] + \beta E[\tilde{V}_{j+1}(x')]$$

- subject to

$$a_{j+1} + nc_{sj} + dc_{fj} + mh = e_j + a_j + (1-\tau_k)\pi^f(a_j) + \kappa$$

- $\pi^f(a)$: profits from the Firm's maximization problem
- κ : government transfer guaranteeing a consumption floor for the most destitute

Worker Families

$$V_j(x) = \max_{c_s, c_f, a'} [nu((1-\tau_c)c_s) + du((1-\tau_c)c_f)] + \beta E[\tilde{V}_{j+1}(x')]$$

- subject to

$$a_{j+1} + nc_{sj} + dc_{fj} + mh =$$

$$e_j + \theta_{hi} a[1 + \rho(1-\tau_k)] + (1-\theta_{hi}) a_j (1 + r^d) + \kappa$$

- Most workers save at a bank earning low return r^d
- A small fraction, θ_{hi} earn the return to capital ρ
- e_j: labor income of the parent and the children

Government

- Government taxes consumption and capital income
- Uses the revenues to finance an exogenously given stream of government expenditures G
- In addition, a pay-as-you-go social security programs financed by a payroll tax τ_{ss}
- Fiscal surpluses are saved in a bank account

Calibration

- Data from 1980 to 2014 in China on
  - the total factor productivity (TFP) growth rate
  - the fertility rate
  - the long-term care risk
  - government expenditures and tax rates
  - calibrate the borrowing constraints (η_t) to match the external funding used by Chinese firms

Calibration

- Fertility rates:
  - initial steady state: 4 children per couple (i.e. $n = 2$)
  - one-child policy (+violations): 1.6 per couple, the weighted average of rural and urban population.

Calibration

- Utility function

$$u(c) = \frac{c^{1-\sigma}}{1-\sigma}.$$

- Labor productivity by age: from He, Ning, and Zhu (2015).
- Labor Income Risk
  - Yu and Zhu (2013) estimate the stochastic process for household income between 1989-2009 a-la Guvenen (2009)
  - We discretize to an income shock of 0.36; 1.0; 2.7. (Tauchen, 1986)

Calibration

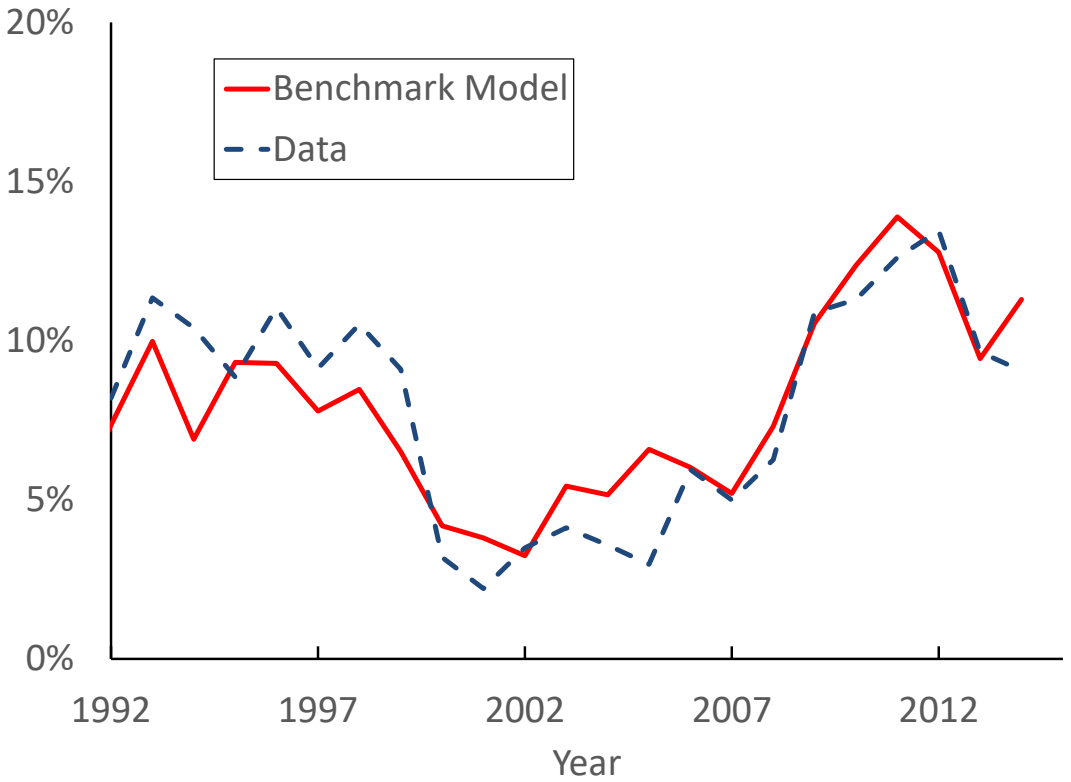
- Social Security: 15% replacement rate.
  - Chinese pension system provided a replacement rate of 60% to the retirees who were covered by the system (Song, et al., 2014).
  - The pension coverage rate: 25% of the population.
  - Replacement rate: (0.60)(0.25) = 15%

Calibration

- Rate of return on foreign bonds: real interest rate implied by the long-term U.S. Treasury bills
- Share of entrepreneurial families ω: 0.10 (match the capital output ratio at the initial steady state)

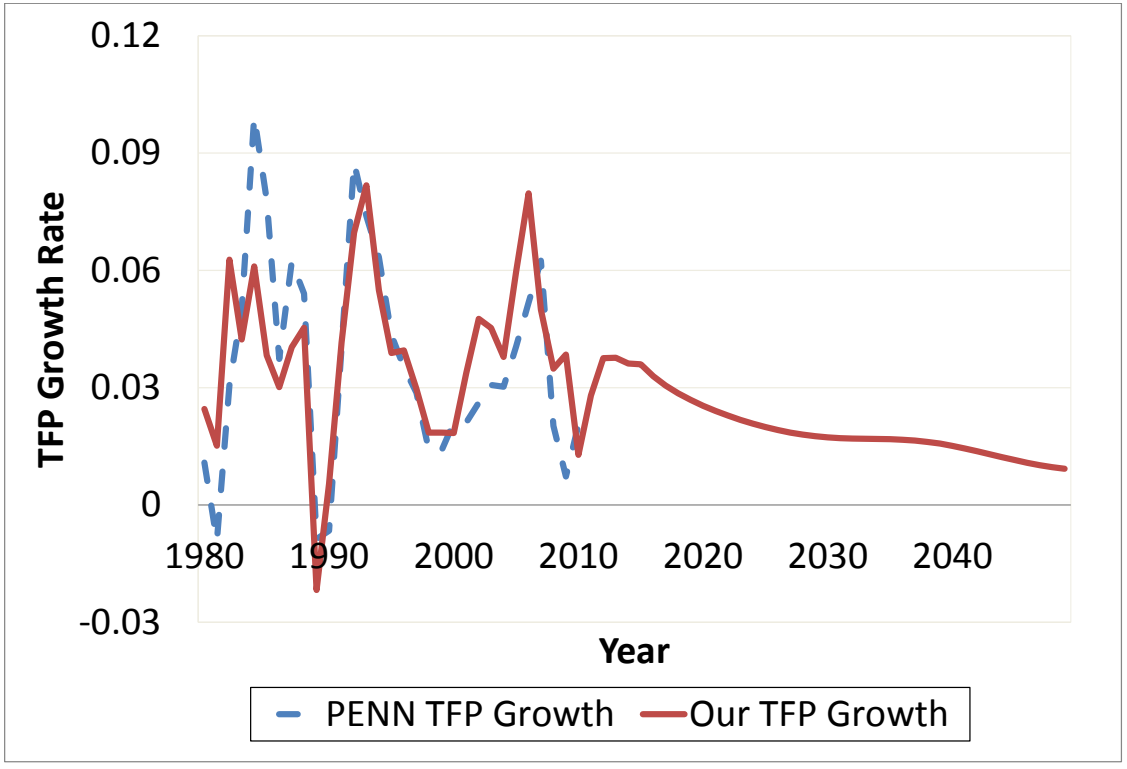
Calibration

Figure 6: External Funds



Calibration

Figure 7: TFP Growth Rate



Calibration: summary

Table 1: Calibration

Parameter	Description	Value
α	capital income share	0.5
δ	capital depreciation rate	0.1
σ	risk aversion parameter	3.5
β	time discount factor	0.99
m	goods cost of LTC services (% GDP per capita)	33%
ξ	time cost of LTC services	0.42
G	government expenditures (% of GDP)	14%
SS	social security replacement rate	15%
$\gamma_{initial}^{1-\alpha} - 1$	initial steady state TFP growth rate	3.1%
$\gamma_{final}^{1-\alpha} - 1$	final steady state TFP growth rate	1%
n_{final}	final steady state total fertility rate	1.0
ω	pop. share with entrepreneurial skills	10%
η	fraction of profits can be pledged at initial SS	0.45

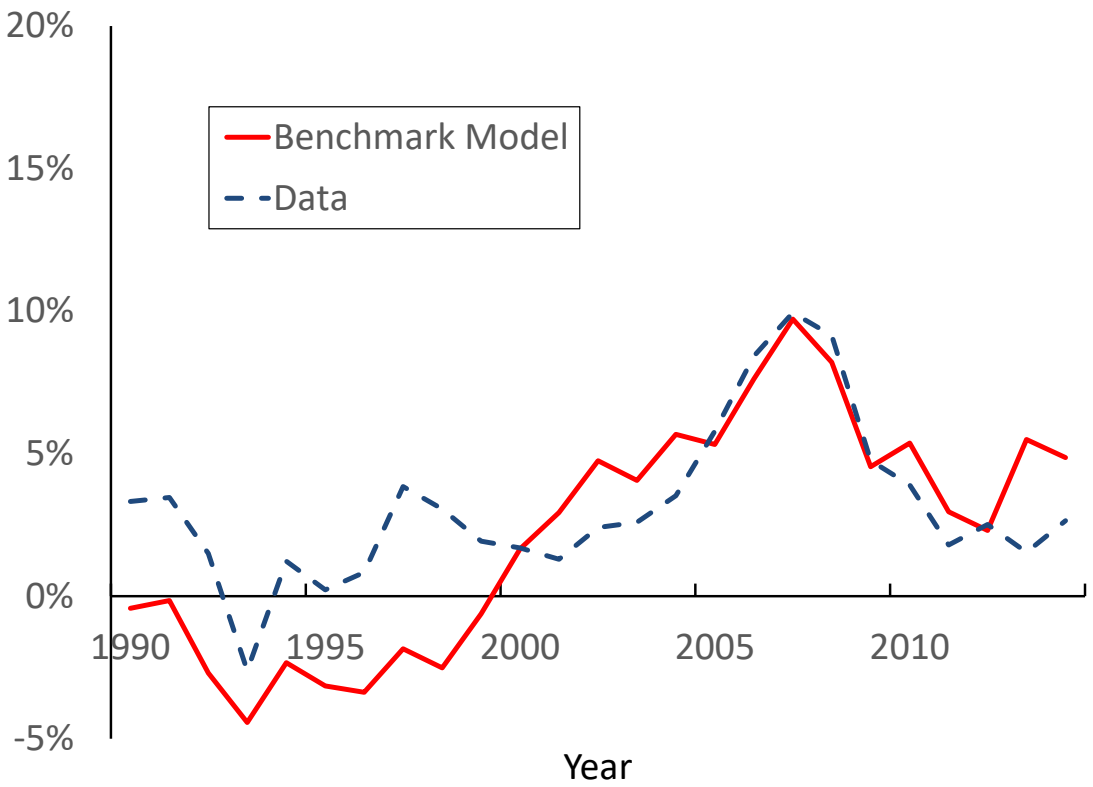
Benchmark Economy

Is this a “good” economy? (İmrohoroğlu and Zhao (2017))

- Do the simulated population shares match the data?
- Wages
- Rate of return to capital
- Intervivos transfers
- Age-saving profiles
  - Household age-saving profiles
  - Individual age-saving profiles

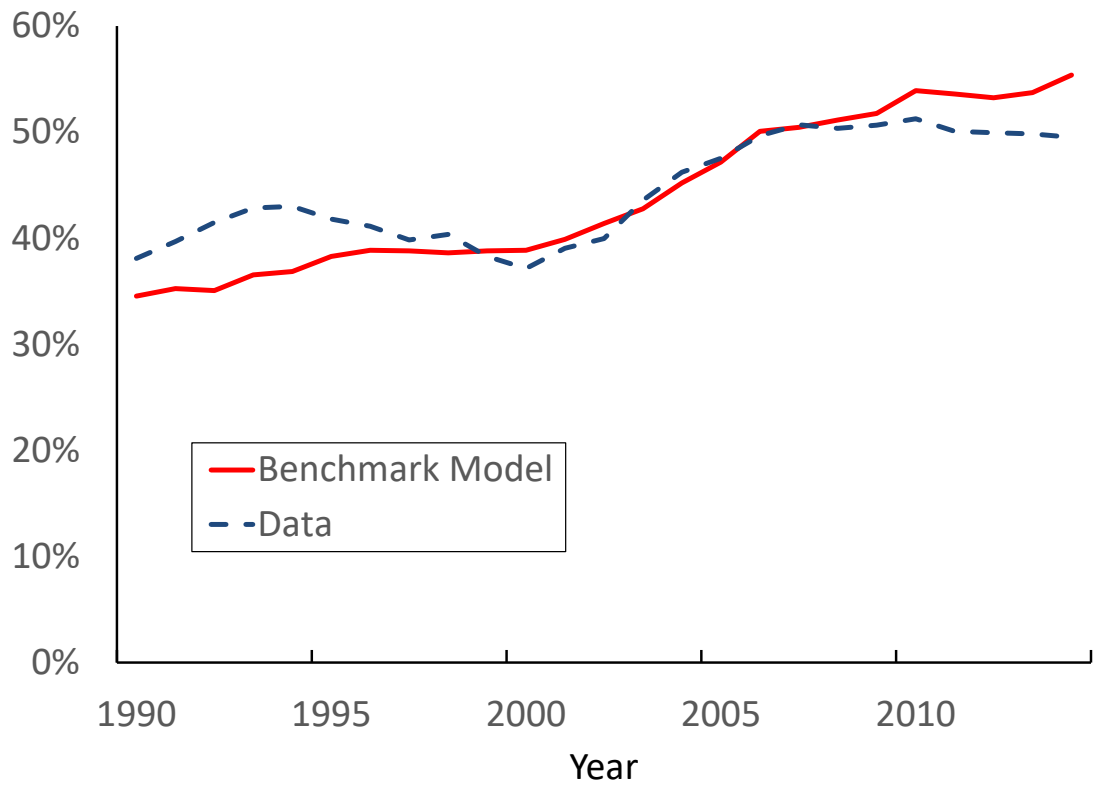
Benchmark Economy

Figure 8: Current Account



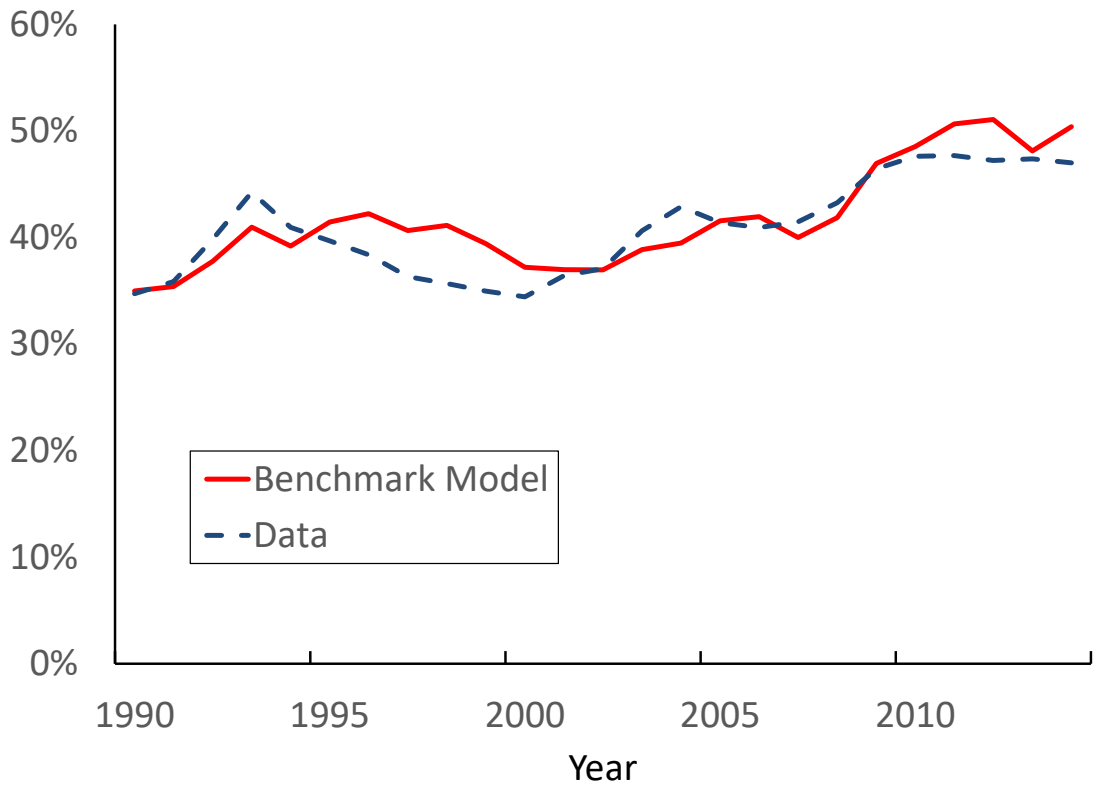
Benchmark Economy

Figure 9: Saving Rate



Benchmark Economy

Figure 10: Investment Rate



Decomposition

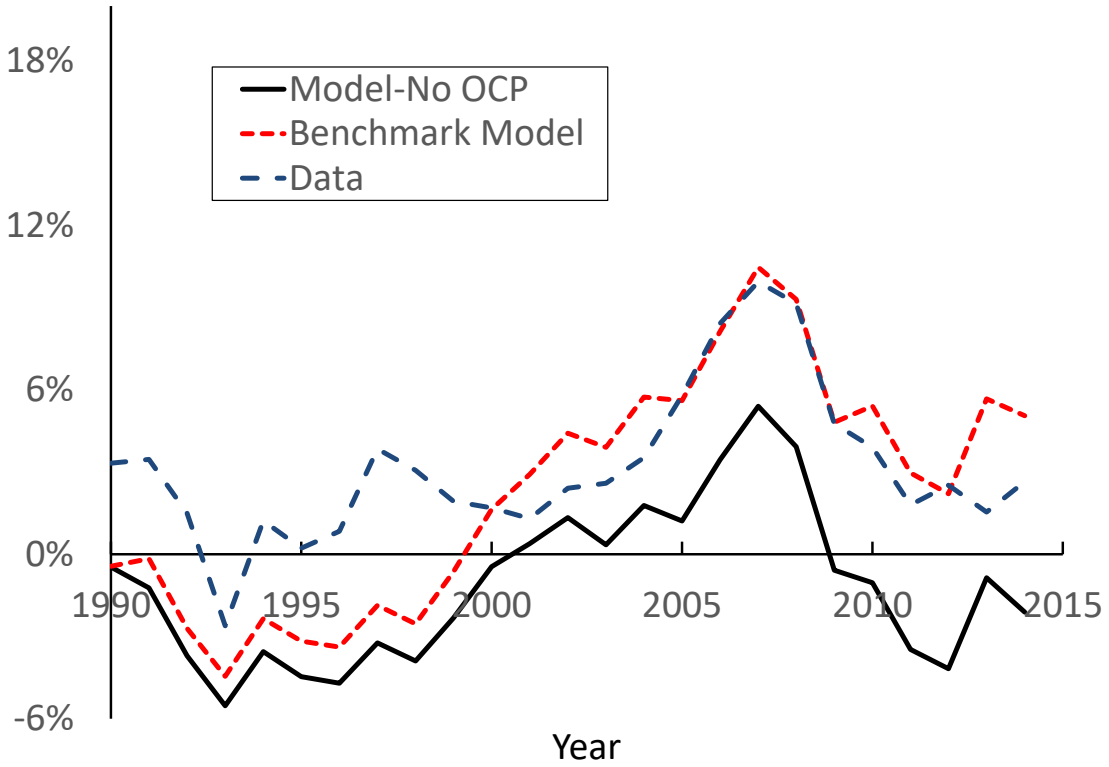
- Examine the role of
  - One-child policy
  - Financial frictions

Decomposition

- No one-child policy
  - the fertility rate gradually declines at a constant rate along the transition path and gets to the replacement rate in 2050

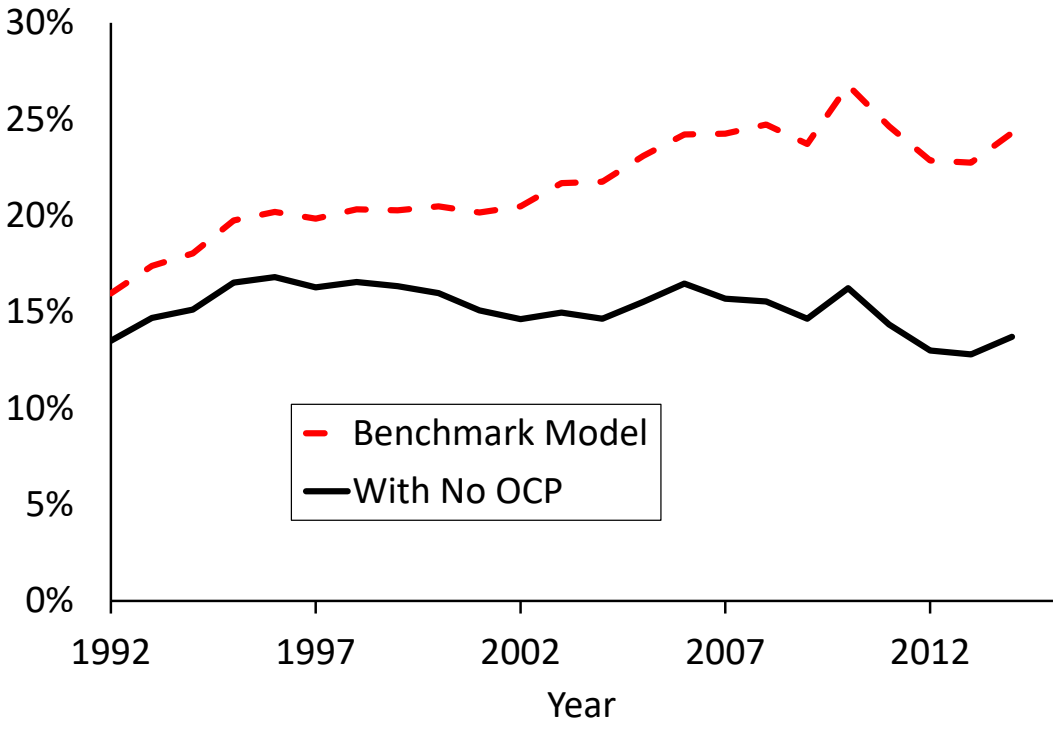
Role of one-child Policy

Figure 11: CA: Role of OCP



Household Saving

Figure 12: HH saving: Role of OCP

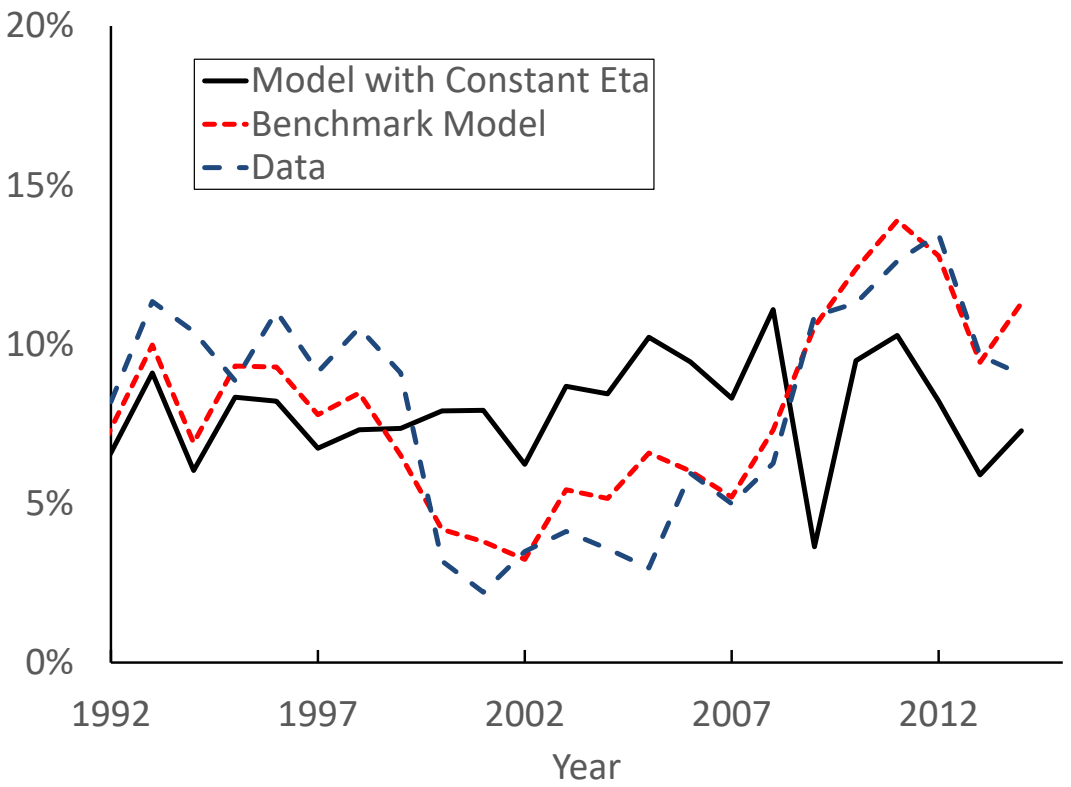


Decomposition: Role of Financial Frictions

- Benchmark: variation in the financial constraints faced to match the amount of external funds (as % of GDP) used by Chinese firms
- Counterfactual: Keep the borrowing constraint constant along the transition

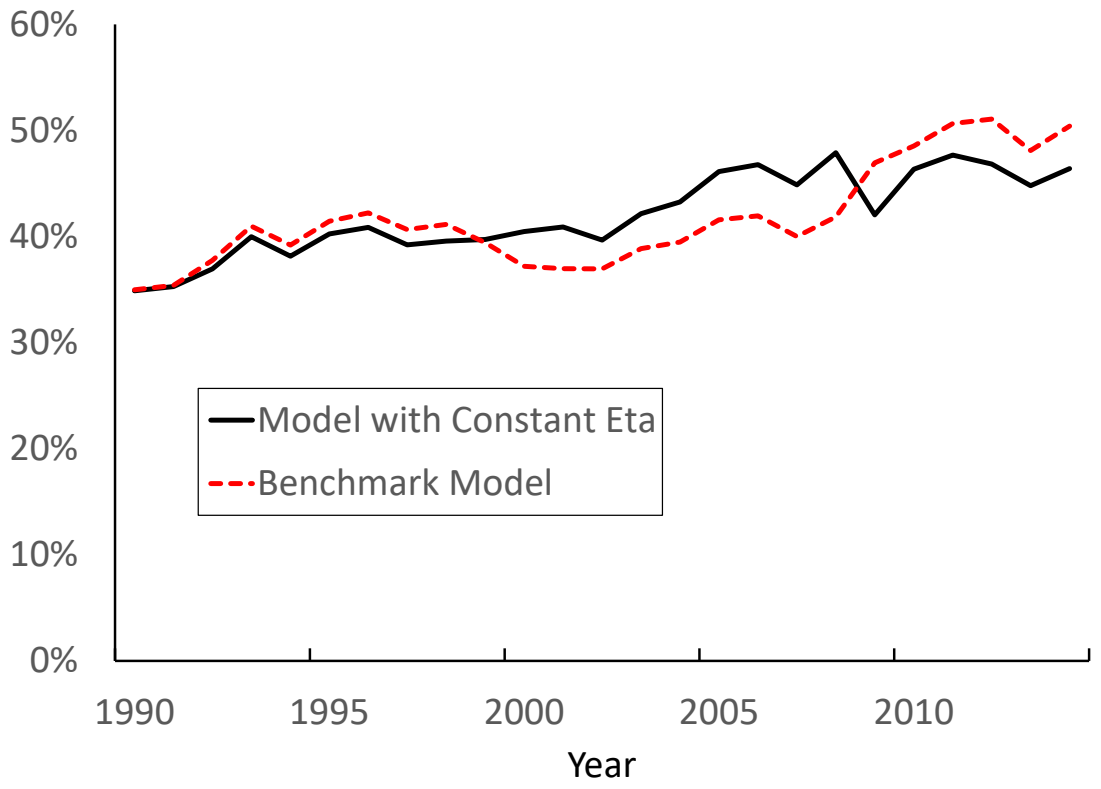
Decomposition: Role of Financial Frictions

Figure 13: External Funds Used by the Firms



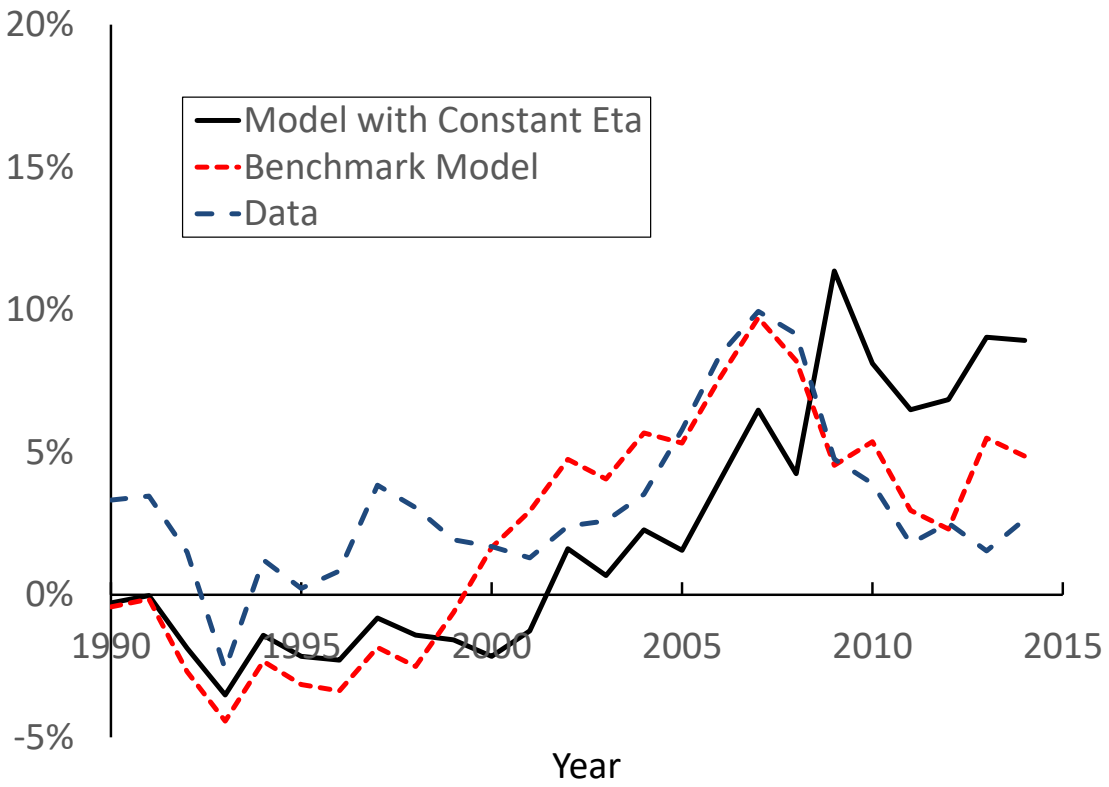
Decomposition: Role of Financial Frictions

Figure 14: Investment



Decomposition: Role of Financial Frictions

Figure 15: Current Account

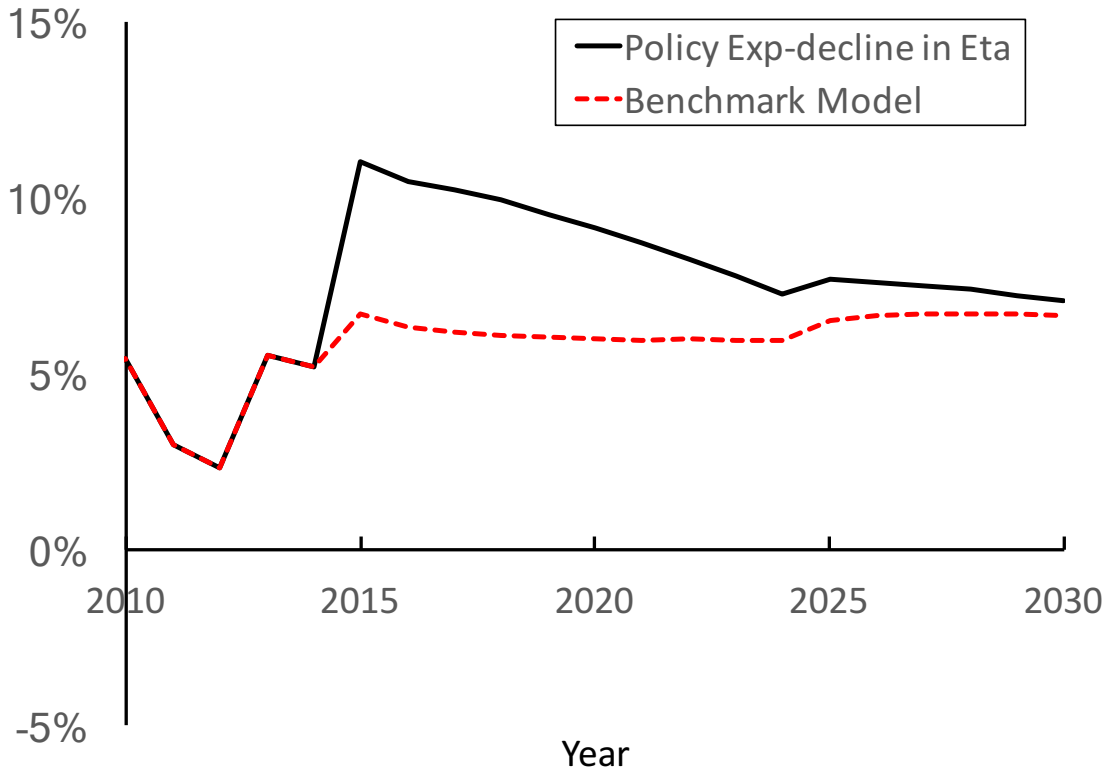


Future

- So far the assumption about the future:
  - Social security replacement rate set at 15%
  - τ_{ss} adjusts to clear the social security budget (2.6% initial steady state to 5.4% final steady state)
  - Borrowing constraints (relaxation of borrowing constraints gradually stops by 2024)
  - Fertility goes back to replacement rate fertility by 2050
  - Taxes and G go back to final steady state values

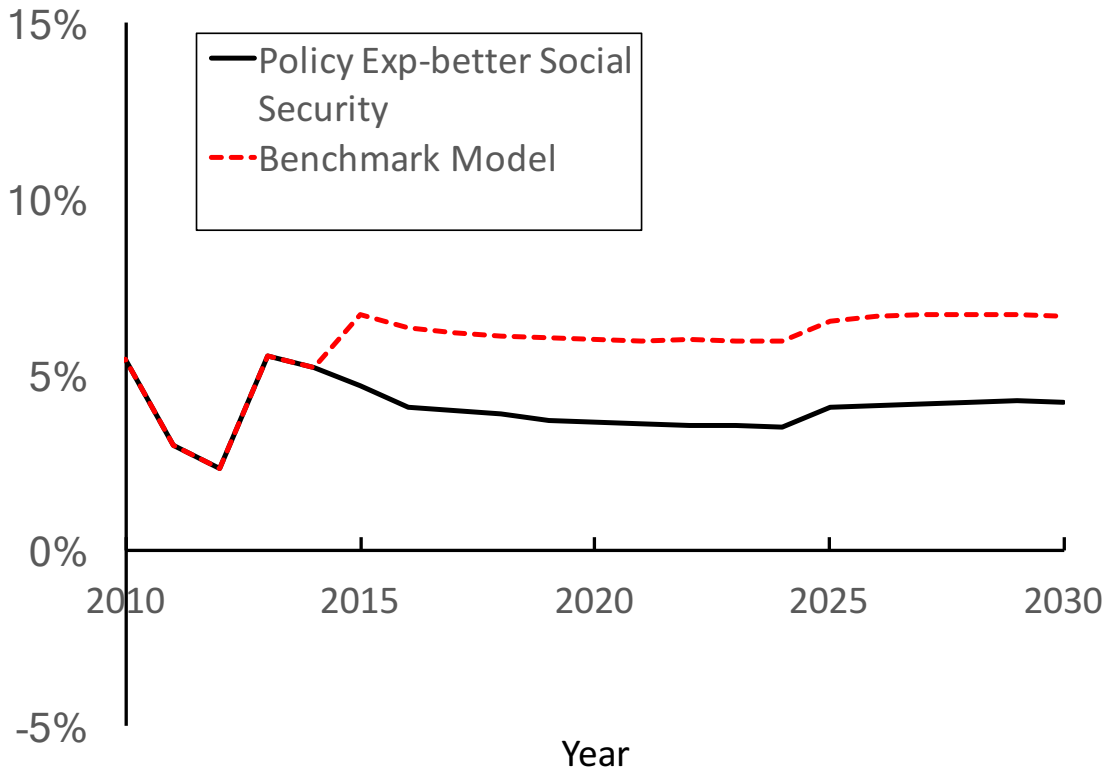
Suppose borrowing constraints back to pre-crises levels

Figure 16: Current Account- Higher Borrowing Constraints



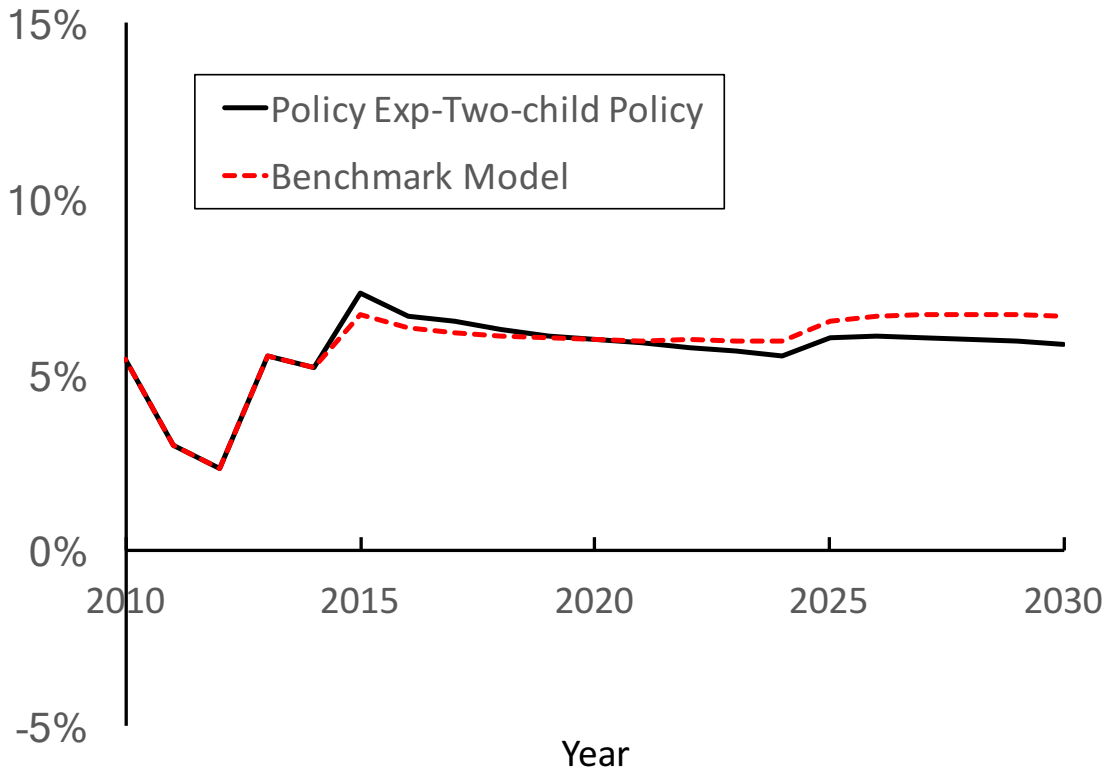
Suppose SS replacement rate increases to 30%

Figure 17: Current Account-Higher SS



Two-Child Policy

Figure 18: Current Account-Two-Child Policy



Conclusion

- A general equilibrium model that captures old-age risks, demographics, and financial constraints
- Household saving play an important role in the increase in national saving
- Financial constraints play an important role in the fluctuations in national investment
- Together they generate changes in CA that resemble the data well
- Factors contributing to the increase in CA between 2004-2008
  - Increase in HH saving
- Factors contributing to the decrease in CA after 2008
  - Relaxation of financial constraints

Conclusion

- Future plans to expand social security
- Aggressive poverty reduction efforts
- Likely to lower national savings
- Lower CA

Conclusion

Thank you!