Discussion of Araujo Schommer Woodford

Conventional and Unconventional Monetary Policy with Endogenous Collateral Constraint

Giancarlo Corsetti
Cambridge and CEPR

FRBNY-HKMA Conference on Domestic and International Dimensions of Unconventional Monetary Policy,

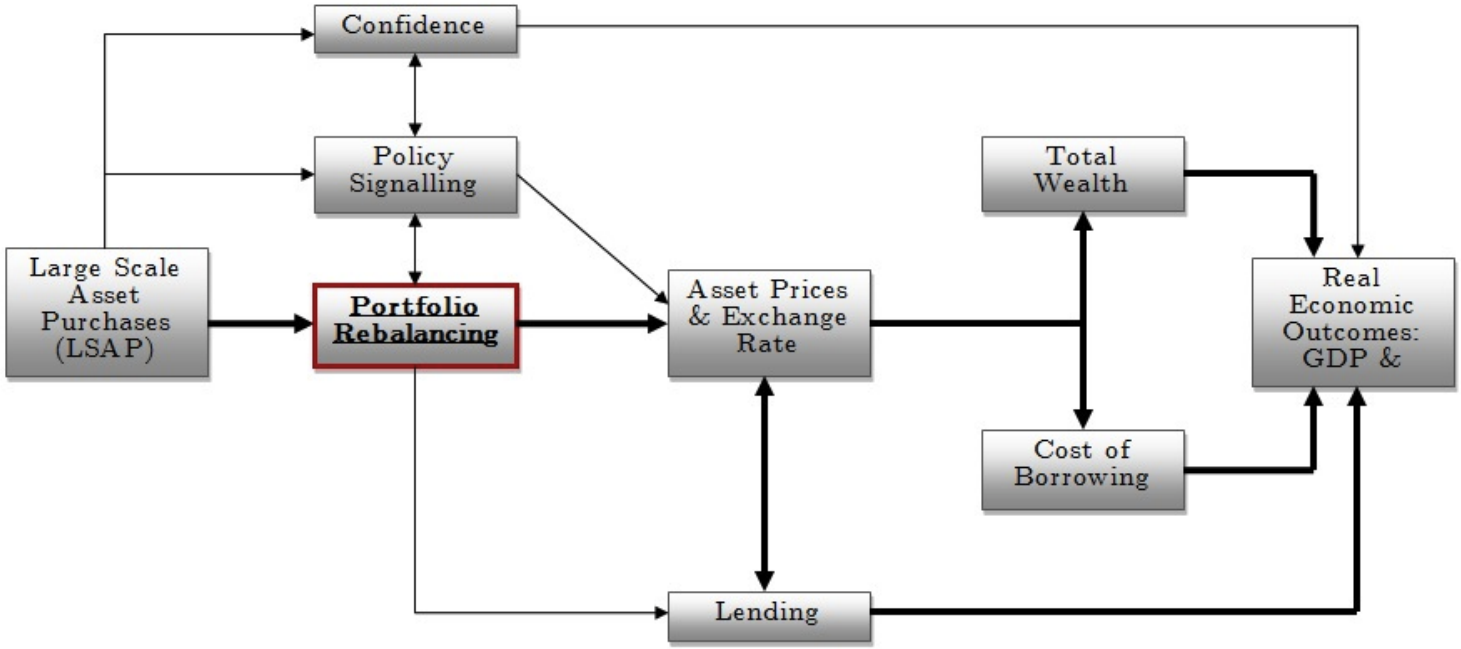
March 20-21, Hong Kong

Introduction

- How does QE work?
  - 'Signaling'
  - Portfolio balance
  - Constraints (hence port. balance)
- The paper addresses last (two).
- Great paper: preamble and chapter in a **treatise on unconventional interventions.**

The "conventional" view

Graph borrowed from BoE and Cambridge researchers



Many questions raised by conventional view

- "CB purchases of risky assets (PRA) raise the price of assets that can be collateralized, relaxing borrowing constraints."
  - Is a rise (or a change) in the price of collateral a necessary condition for the policy to be effective?
  - Is it possible that large-scale purchases could make collateral scarce in some sense?

- "QE changes the relative quantities of assets that are not perfect substitute in the market, affecting their prices hence households/firms choice. Namely, the central bank can load "risky assets" on its balance sheet, shifting private portfolios towards the less-risky asset."
  - How can the risk loaded on the central bank balance sheet disappear from private sector opportunity set?

Outline

1. A 'quick look' at the model
2. Private budget and social risk
3. The transmission of PRA given collateral price
4. General equilibrium effects of price changes

An unconventional discussion: mostly through graphs.

1. A 'quick look' at the model

- Endowment economy; two periods 1,2; states $j = 1..S$; households $h = 1, 2, ...$ heterogeneous in endowment.
- 2+1 goods: nondurable e_1,e_{j1}; durable e_3; services from durables (rents) with choice x_2, x_{j2}.
- Government:
  at t=0 finances initial public debt d;
  at t=1 raises taxes (subsidy).
- Central bank:
  issues Reserve liabilities $M(1+i)$ perfect substitute for default-free debt d;
  purchases debt d^{CB} and a fraction of risky assets $\omega \cdot x_3$;
  sets i.

A 'quick look' at the model

- Collateral after Geanakoplos / Araujo:
  - endogenous;
  - private borrowing is collateralized state by state, hence the constraint is binding in the 'worse' case.
- Building on Araujo: focus on an equilibrium allocation in which S states are traded with full collateral.
- Absolutely great graphical analysis.

2. A first key contribution: private budget and social risk

- PRA creates future implicit tax (subsidy) liabilities for the private sector proportional to

$$TAX_{s2} = \theta^h \cdot \left[\left(d + \overbrace{\left(M(1+i) - d^{CB} - \underbrace{p_{s3}\omega x_3}_{\text{stochastic component}} \right)}^{\text{capital gains/losses on CB balance sheet}} \right) \right]$$

  - d debt; d^{CB} held by Central Bank; $M(1+i)$ CB liabilities perfect substitute with d
  - $p_{s3}\omega x_3$ value in state s of risky assets held by the CB.
  - θ^h household h exposure.

- Risk does not disappear from households' opportunity set.

The central bank "collateral"

- ...is the ability of the government to raise taxes against CB contingent liabilities

$$\theta^h \cdot \left[\left(d + \overbrace{\left(M(1+i) - d^{CB} - \underbrace{p_{s3}\omega x_3}_{\text{stochastic component}} \right)}^{\text{capital gains/losses on CB balance sheet}} \right) \right]$$

3. Effective intertemporal/intra-temporal transfers with/without central bank PRA

- What matters for portfolio decisions are **effective transfers between 1 and each states in 2**, resulting from both **private portfolio decisions** and the **resources transferred by public sector policy** via asset purchases. At t=2 in state s

$$\widetilde{y}_{s2} = \left.\begin{array}{c} \frac{1+i}{p_{s1}}\,(\text{public debt}) + \frac{1}{p_{s1}}(\text{lending minus borrowing}) + \\ \text{value of collateral } \frac{\mathrm{p}_{s3}}{p_{s1}} x_3^h \end{array}\right\} y_{s2} +$$

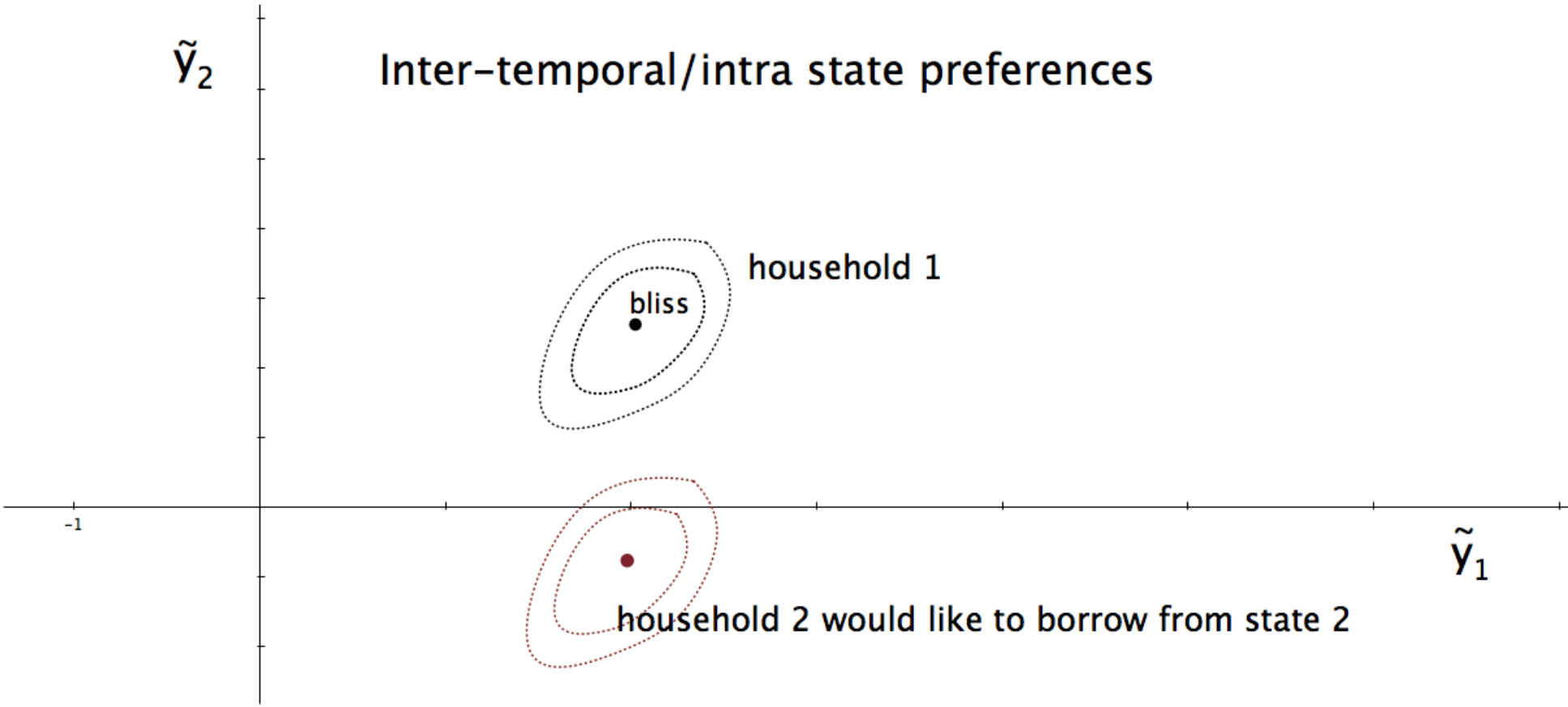
$$+\theta^h \cdot [\ldots]\, \omega e_3$$

- Fully collateralized lending means that the maximum a household can borrow from state s is the state-s value of the collateral they own:

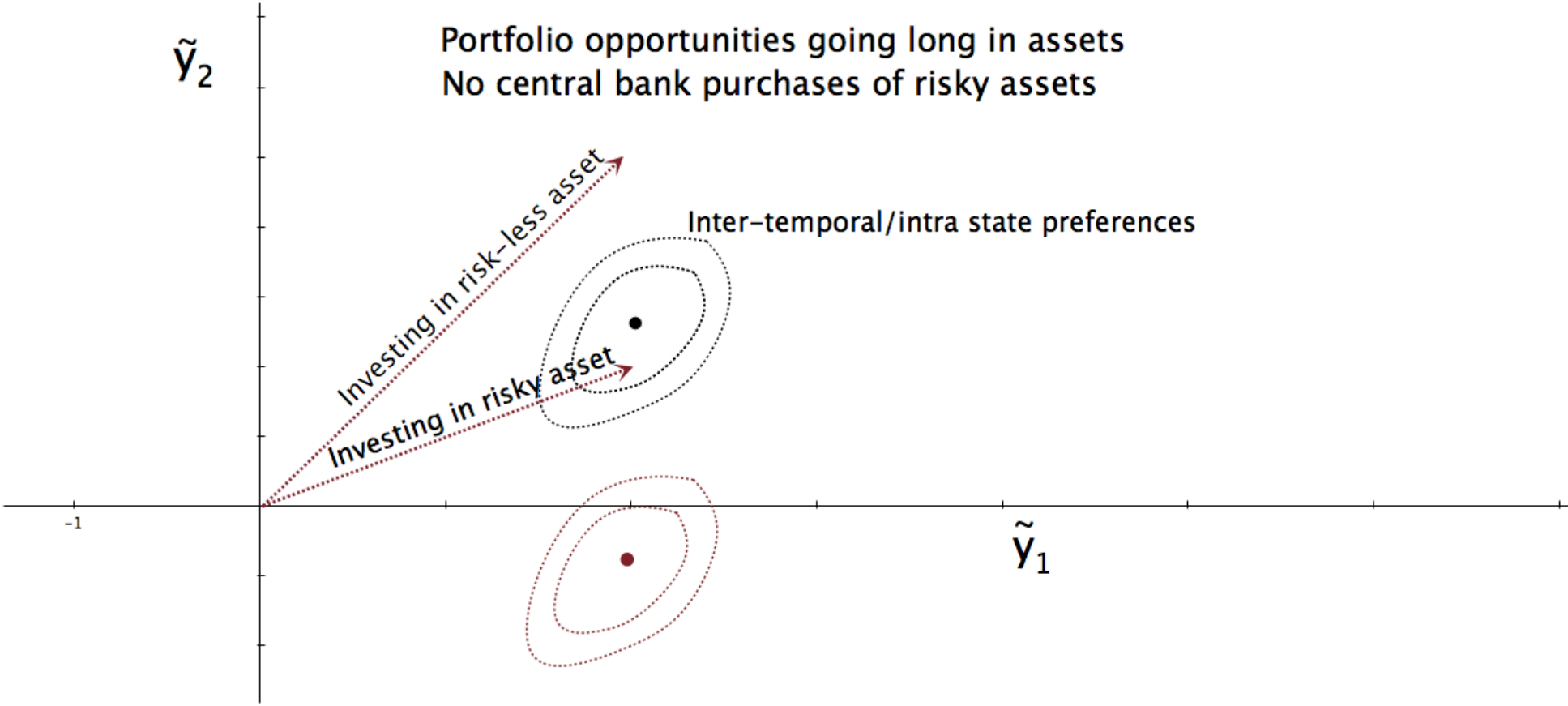
$$y_{s2} \geq 0 \qquad \Longrightarrow \qquad \widetilde{y}_{s2} \geq -\theta^h \cdot \phi\,(.)\, \omega e_3$$

- Two state s=1,2, two household type example.

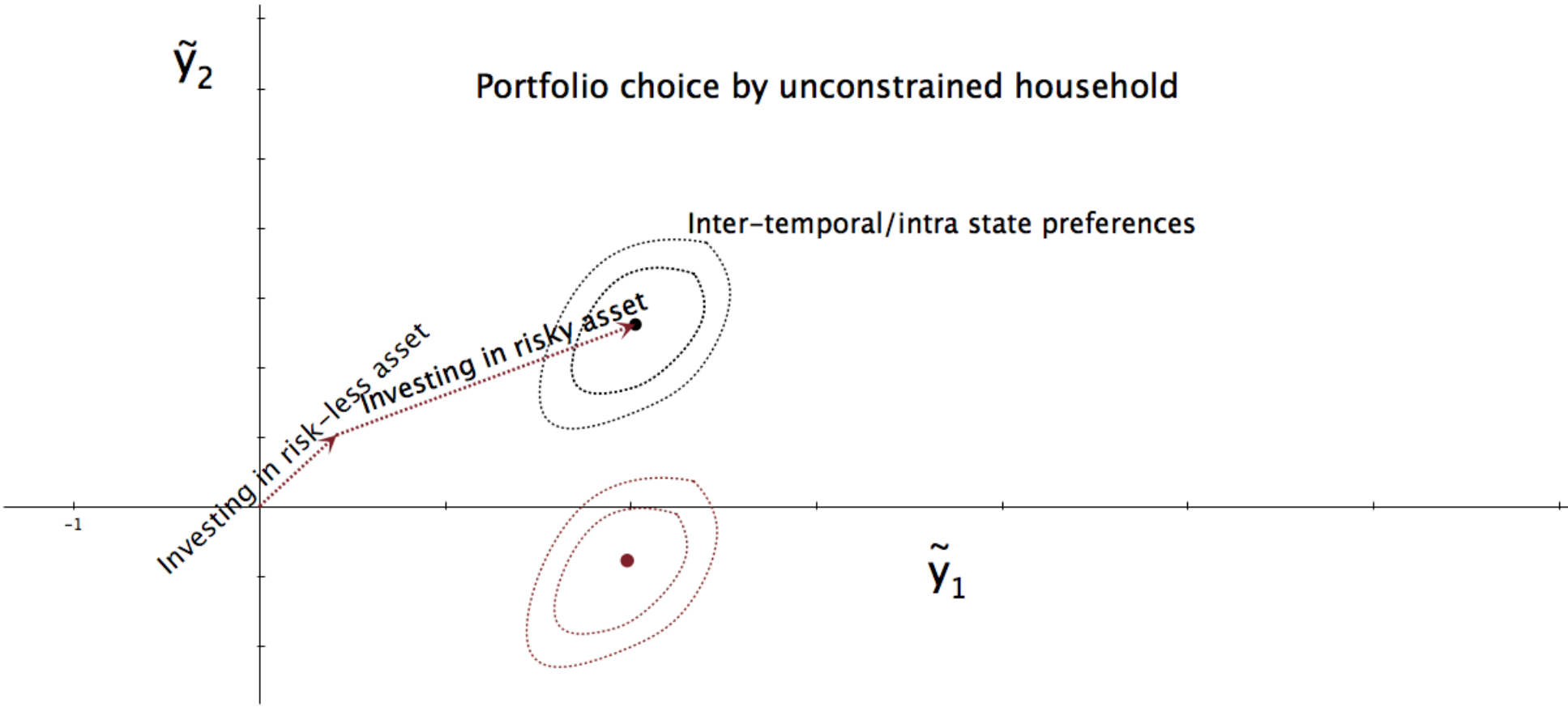
Bit of homework: preferences are invariant to policy in the space $\tilde{y}$



Bit of homework: investing in riskless and risky assets

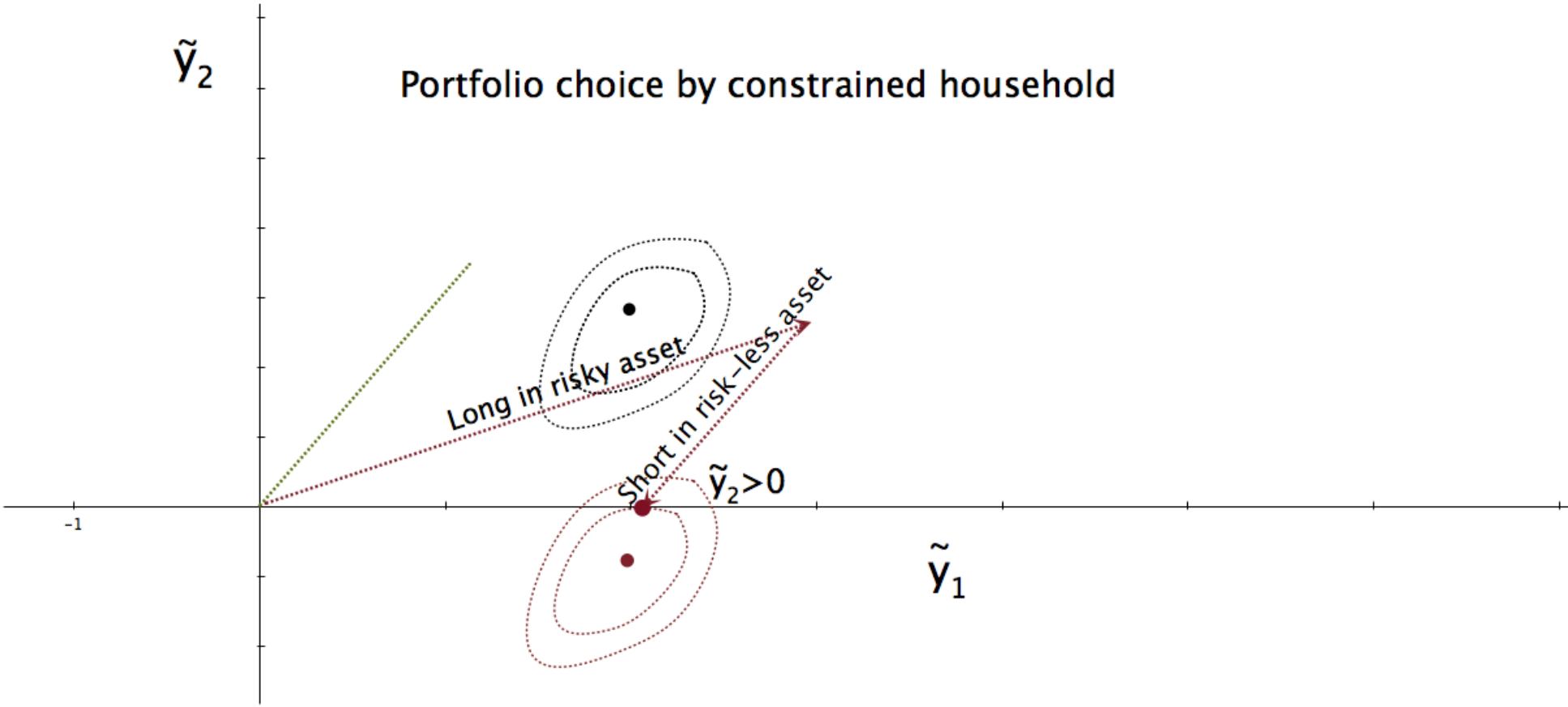


Bit of homework: optimal portfolio by the unconstrained household



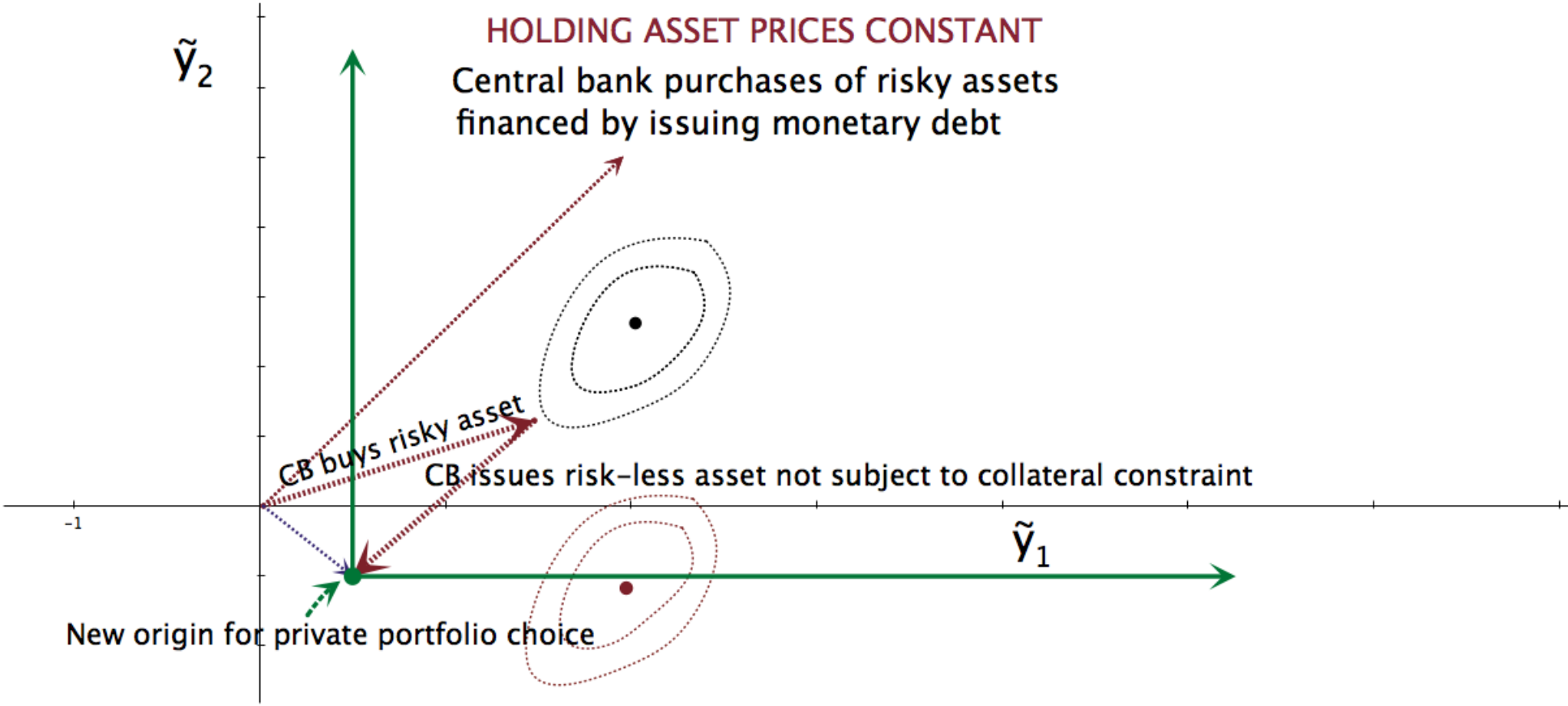
Optimal portfolio by the constrained household

Because of the collateral constraint, the household cannot borrow pledging as much as state 2 output they would like to.



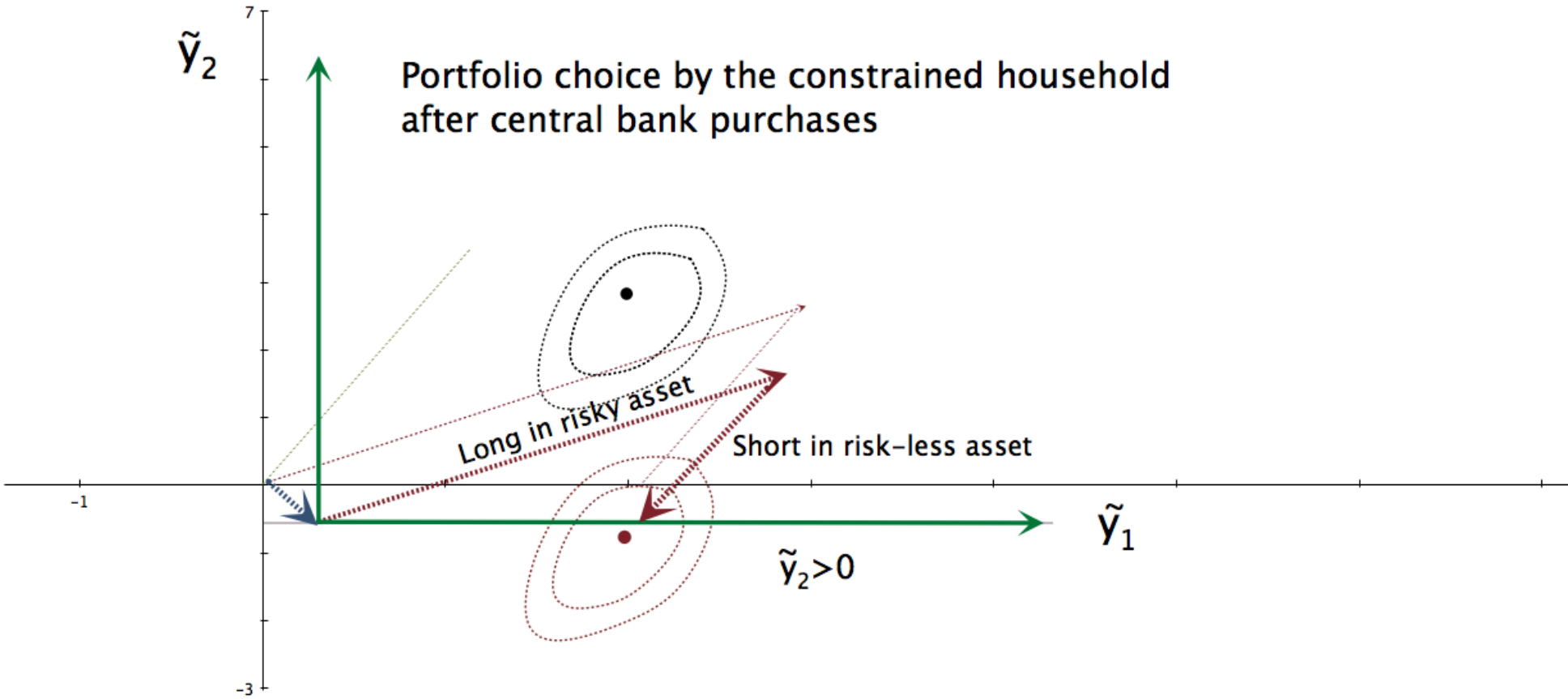
The effects of central bank 'portfolio' (PRA) policy: redefine the metric of private portfolio choice

Shift the axes: There is no non-negative y2~ constraint on the central bank



Hence PRA relaxes the household 2's collateral constraint

Household 2 is 'natural buyer' of risky collateral, since more collateral allows it to borrow more from s=2 and increase t=1 demand (moving closer to bliss)



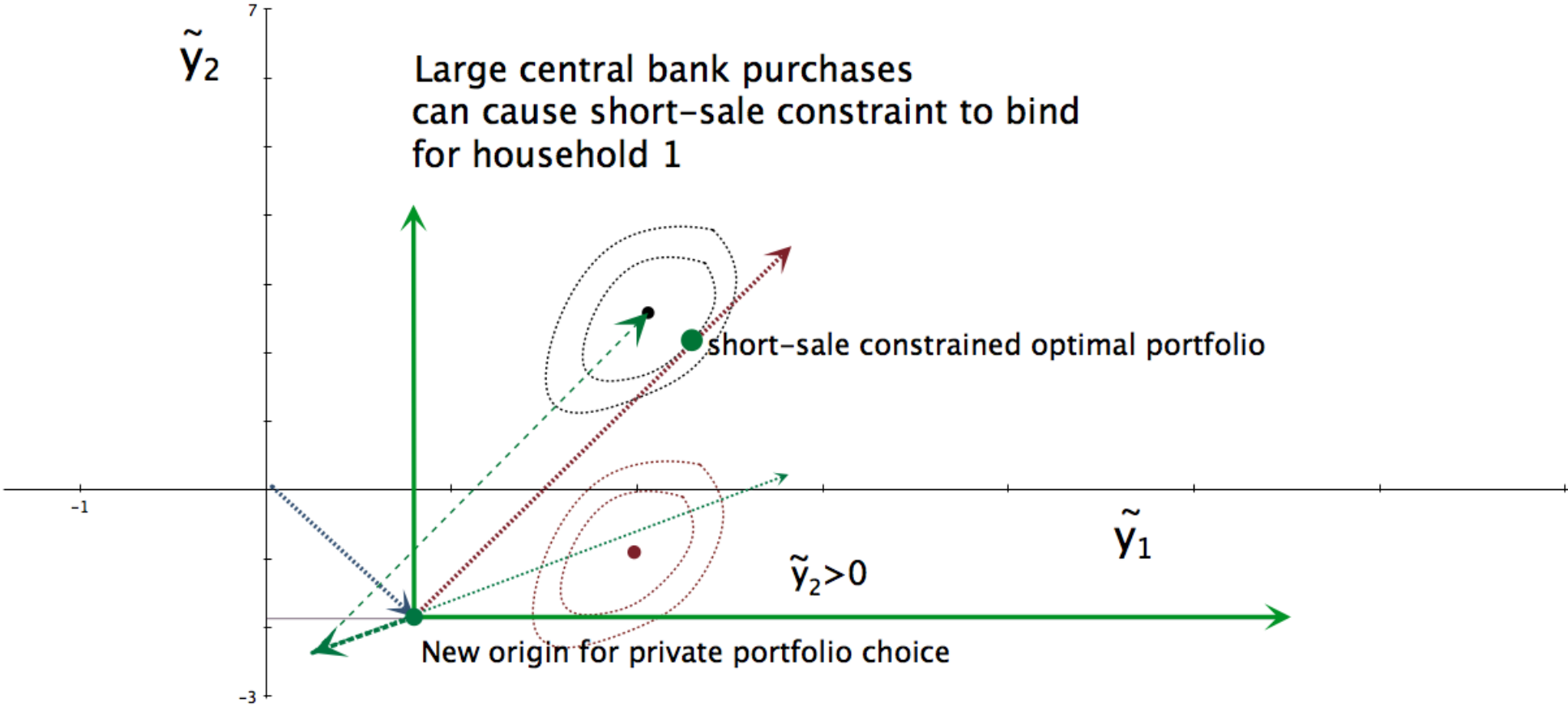
Key results

- No portfolio balance effects if households are away from constraints
  - private agents rebalance their portfolios to compensate for QE-PRA
- QE-PRA relevant if households are constrained — time of financial crisis/distortions
  - QE-PRA effective independently of asset price changes

- However, there is a sense in which QE-PRA can be too much:
  - it may create constraints that would not exist at least for some households

"Large purchases" transfer a lot away from s=1

After large QE-PRA, household 1 may want to short the risky assets — with short-sale constraints, it is forced to hold too much of y1 and y2



4. Endogenous asset (state) price effects

may actually make QE-PRA less effective

- When the central bank buys risky debt financing it with sure debt, the intervention can be expected to raise the collateral price relative to debt price => financing collateral becomes more expensive.
  - **Adverse terms of trade effects** may hurt constrained households.

- Intuitively, **race-horse between a changing shadow value of constraint, and adverse terms of trade effects.**

Prices can move either way, but pattern not arbitrary

- Assume: Homothetic preferences, some type-2 households in the economy: state price a_1 is independent of policy.
  Hence QE only affects state 2 price a_2 (in terms of good 1).
- QE-PRA that raises the nominal price of risky durables and lowers their spread

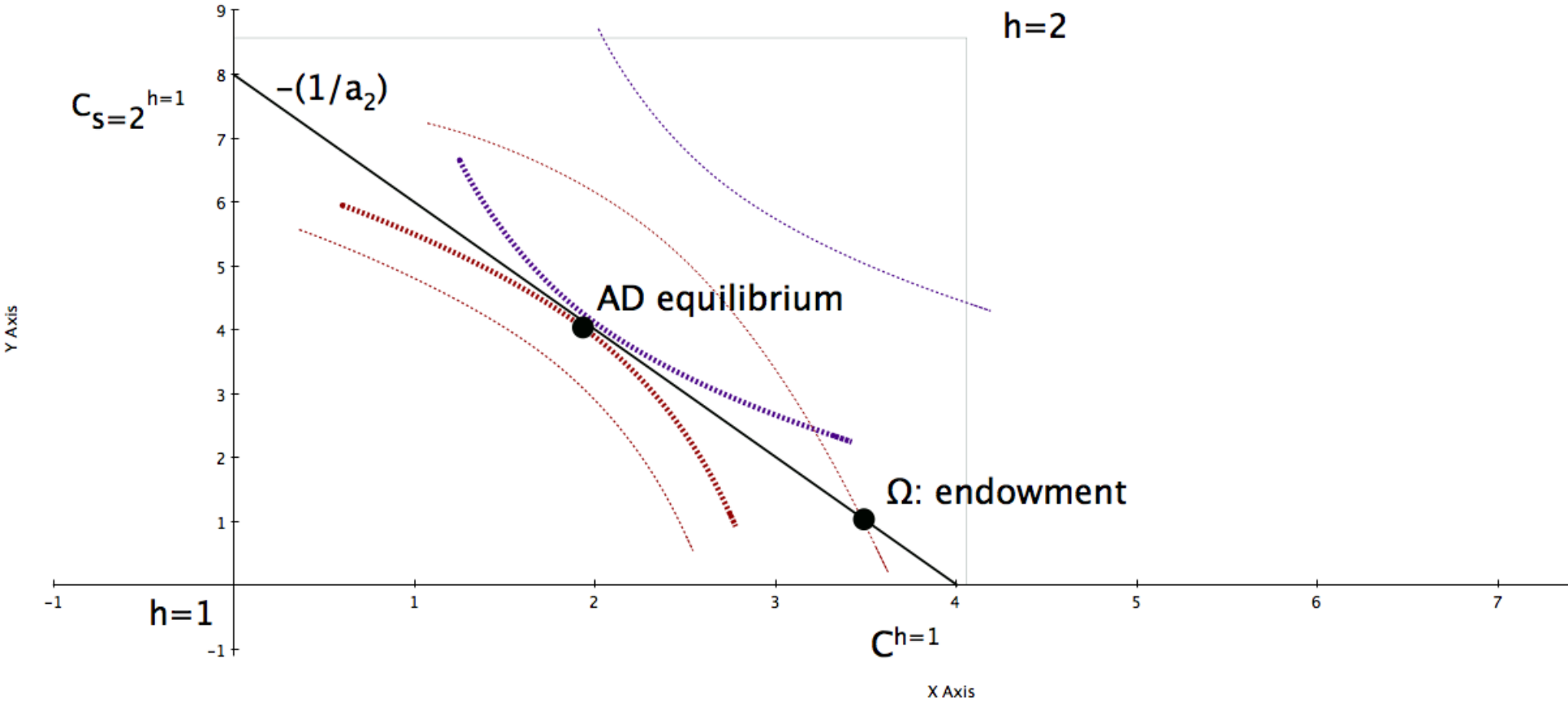
$$p_3 \uparrow \qquad \text{and} \qquad \left(r^{dur} - r\right) \downarrow$$

  must also raise the returns on both durables and nondurables, raise t=1 nominal expenditure and prices, reduce the real price of nondurables

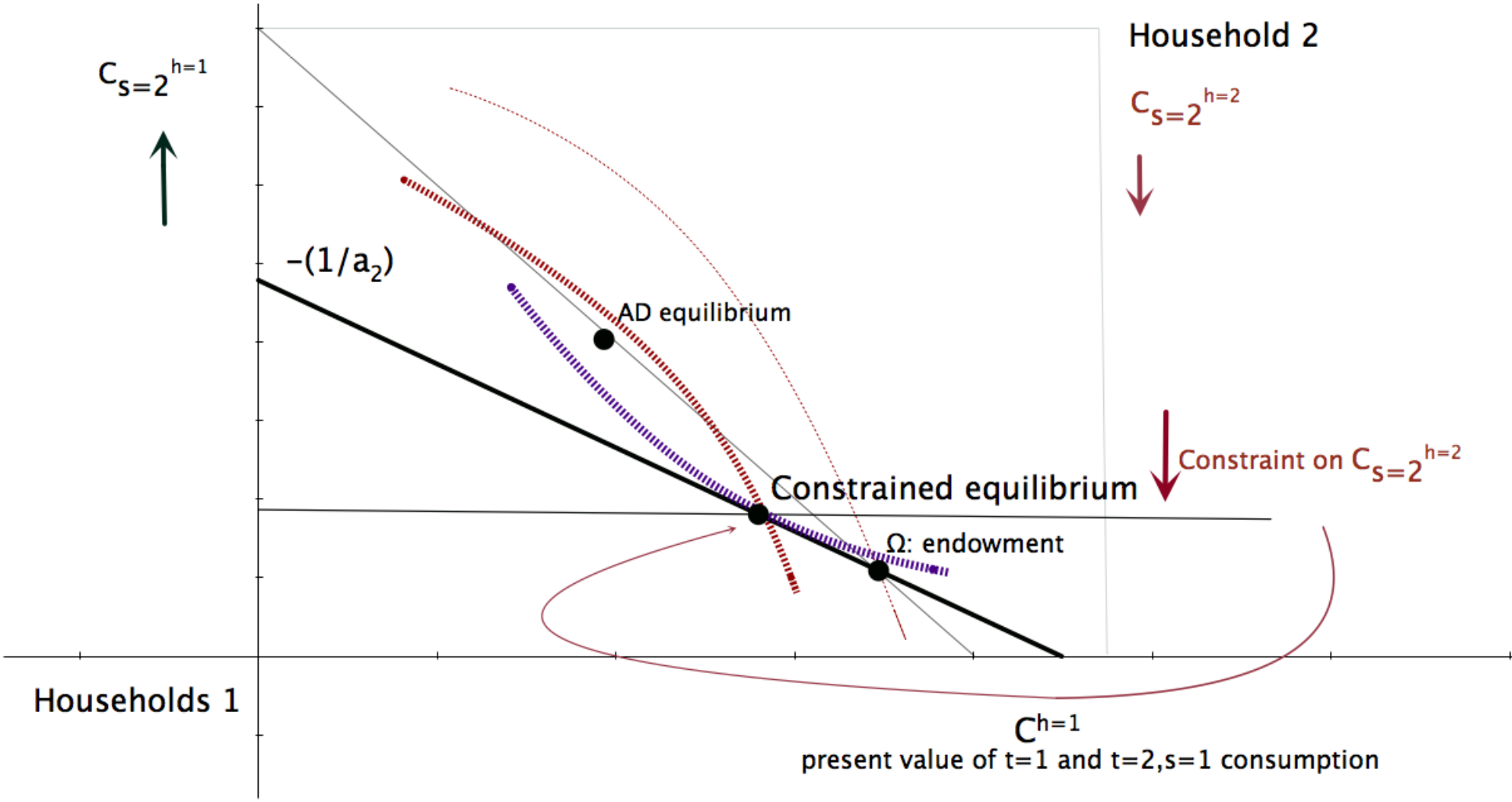
$$r^{dur} \uparrow, \quad r \uparrow\uparrow, \quad p_1 \uparrow, \quad \frac{p_3}{p_1} \downarrow$$

- But the opposite pattern is also possible.

Edgeworth box: efficient (unconstrained) allocation:

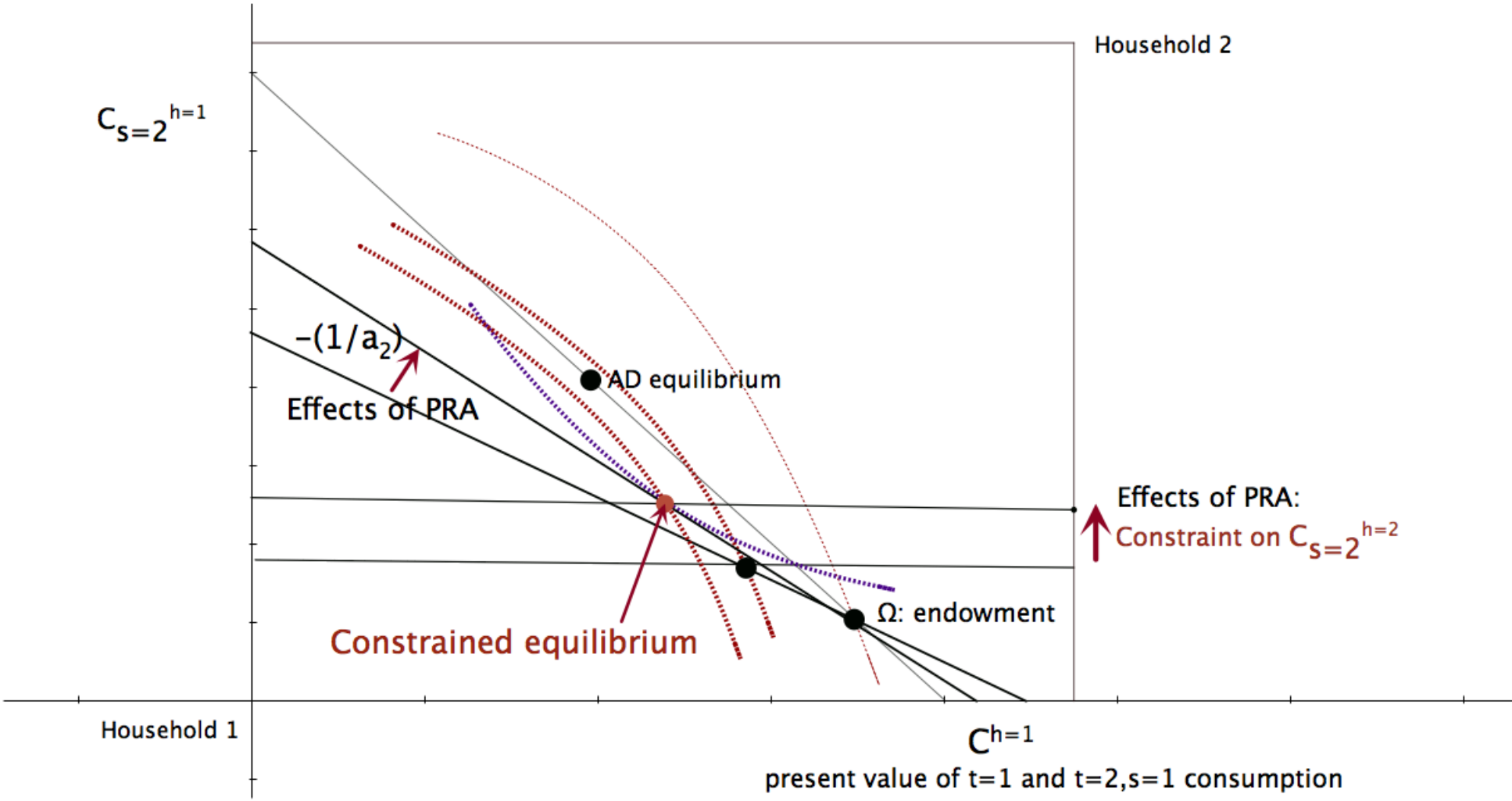


Allocation with type-2 constrained households



The effect of QE-PRA

PRA tilt budget line clockwise: in the picture, h2 is better off than in the AD allocation. Larger PRA will eventually make it worse off



Is Monetary QA-PRA fiscal policy?

- Yes. The model could be relabelled as a public programme of asset purchase.
- Early examples in the literature on the multiplier in open economy:
  - Households are credit constrained, housing stock is collateral
  - Government buys 'houses', relaxing the constraint: Effects on output saving and the current account (Callegari)
  - Heterogeneity: domestic-foreign.

Is QA-PRA the same if carried out by the CB or the goverment?

- In general, the interest rate on "reserves" (monetary liabilities of the central bank) can be expected to be lower than the interest rate on government and private papers.
  - Roots to be fully investigated ("Mystery of the printing press").
- Can PRA by CB actually affect risk in the private sector opportunity set, in ways that PRA by the government cannot?
- If so, what is the scope for monetary authorities to use this prerogative? Some ways may be more 'appropriate' than others
  - monetary backstop of government debt (off-equilibrium threat) versus
  - credit policies (Gertler and Karadi).