Long Run Inflation and Financial Panics

Nikolay Hristov[a] and Dominik Menno[b]

[a] Deutsche Bundesbank and CESifo
[b] Deutsche Bundesbank

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Introduction: Motivation

- **What are the financial stability consequences of a higher long-run inflation rate?**
  - Recurrent question in recent policy debates *("higher for longer")*.
  - Potential reasons for higher long-run inflation - deglobalization, decarbonization, ... (Blanchard, 2022; IMF, 2023; Afrouzi et al., 2024).
  - **Answers ???**...
  - **This is where our analysis steps in.**

- **Macroeconomic effects of higher target/trend inflation?** - existing literature pointing to:
  - stronger allocation distortions, higher macroeconomic volatility, more difficult to stabilize inflation, higher likelihood for indeterminacy (e.g. Ascari and Sbordone (2014), Marsal et al. (2023), Ascari et al. (2023)),
  - larger distance to the zero lower bound (e.g. Willams (2009), Blanchard et al. (2010), Ball (2013)).
  - **Evidence** - a wide range of (time varying) trend inflation rates in advanced economies.

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- **Research question:** How do different trend inflation rates affect the probability (and severity) of banking crises?

- **Framework:** small scale DSGE model by Gertler, Kiyotaki and Prestipino (2020)
  - non-trivial financial stability consequences due to explicit modelling of *bank-runs*,
  - extended by explicitly modelled trend inflation,
  - calibrated to the Euro Area.
  - Runs are **unanticipated**.
  - Runs hit the aggregate banking sector due to symmetry across banks and depositors.

- Our analysis is **purely positive, fully non-normative**.

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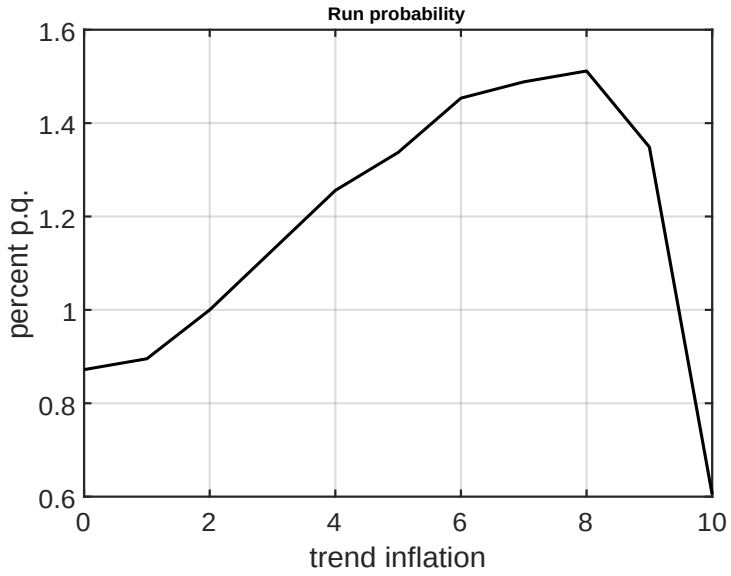
Introduction: Main Findings



Notes: Percent per quarter at different levels of trend inflation.

Mechanism:

- Larger drop in asset prices ⇒ larger drag on banks' balance sheets ⇒ higher likelihood of bank insolvency in a panic.
- Asset price drop in a run – shaped by two opposing forces:
  - **(1) magnified by higher goods-sector markups** ⇒ stronger drag on expected earnings on assets.
  - **(2) attenuated as non-banks' comparative disadvantage in credit intermediation diminishes** ⇒ relatively stronger demand for assets. Effect consistent with evidence by e.g. Drechsler et al. (2017); Chen et al. (2018), Xiao (2020).
  - **Effect (2) dominates for sufficiently high trend inflation.**
  - *(3) trend inflation reduces bank profitability in normal times which incentivizes them to deleverage. This effect is quantitatively less important.*

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Sketch of the Model: Banks and Financial Frictions

- Banks collect deposits and build equity by retaining earnings (net worth) and provide credit to firms under perfect competition.

- **Moral hazard and endogenous incentive constraint**. Akin to a leverage constraint:
  - Moral hazard: banks can choose to divert the resources without repaying depositors.
  - Constraint gives rise to a *financial accelerator effect*.
  - **Friction also makes runs possible**: Due to moral hazard, nobody will roll over her deposits if banks have insufficient net worth (a violated incentive constraint).

- **Intermediation inefficiency** - intermediation by non-banks (e.g. households, the state or a bad bank) less efficient (**comparative disadvantage**). In the case of run, banks sell assets to non-banks.
  - Comparative disadvantage **crucial for asset prices to fall in the case of run**.

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Sketch of the Model: Run as a sunspot equilibrium

- The run is a **sunspot equilibrium (coordination failure)**.

- Run emerges if two conditions are simultaneously met:
  - **(A)** In the case of a run, banks become insolvent. $\Rightarrow$ runs are *possible*.
  - **(B)** Each individual depositor expects that all other depositors will run.

- **"Run indicator"**, corresponding to condition (A):

$$\mathbf{x_t^*} = \frac{R_t^{b,\star}}{R_t^\star} \frac{\phi_{t-1}}{\phi_{t-1} - 1} < \mathbf{1} \Rightarrow \text{ run } \underline{\textit{possible}} \qquad \mathbf{x_t^*} \geq \mathbf{1} \Rightarrow \text{ run } \underline{\textit{not possible}}$$

- **"Run probability"**, corresponding to conditions (A)+(B):

$$Prob(\text{run}) = Prob(\mathbf{x_t^*} < 1) * \iota, \qquad \iota : \text{ calibrated sunspot probability}$$

Sketch of the Model: Rest of the Economy

- **Households (HH):**
  - Consume and supply labor, invest in deposits as well as provide credit to firms.
  - However, HH are **less efficient than banks** when providing credit (inefficiency enters utility function).
- **Firms:**
  - Need credit to purchase capital.
  - Produce with capital and labor, face price stickiness (Calvo).
- **Central bank** - follows a Taylor rule.
- **Positive trend inflation:**
  - Inefficient resource allocation due to **higher price dispersion**.
  - Inefficiency due to **higher average monopolistic markups**. For any given marginal costs, price adjusters set higher prices anticipating the future erosion of their profits du to trend inflation.
  - Firms become **more forward looking** (flattening of the Phillips curve).

Parameterized to quarterly EA data at 2% average inflation

Parameter	Value	Model	Data Target	Source of Data Target
Households				
Non-bank interm. cost	0.12	-15%	-13.4%	Investment drop in run, Euro Area 2009, Eurostat
Non-bank interm. cost threshold	0.59	0.42	0.42	Banks financial assets share, av. 2001 - 2019, Eurostat
Banks				
Bank survival rate	0.93	0.175%	0.15% - 0.2%	Dividend to asset ratio, av. 2005 - 2019, Lang/Menno 2023
Return on diverting assets	0.076	0.5%	0.5%	EA av. spread, 2001 - 2019, SDW
Equity injection entering banks	0.011	16	16	Bank leverage, av. 1998 - 2019, SDW
Sunspot probability	0.12	4%	4%	Financial crisis probability p.a., literature
Price setting				
Elast of subst btw goods	10	11.1%		Mark-up over marginal costs, literature
Prob of constant price	0.75	25%	20-25%	Frequency of price changes, literature

- Rest of parameters standard from literature or calibrated to standard targets
- Solve model with piecewise linear perturbation method
- Run equilibrium computed by evaluating approximated policies at the implied run values for net worth and intermediated assets

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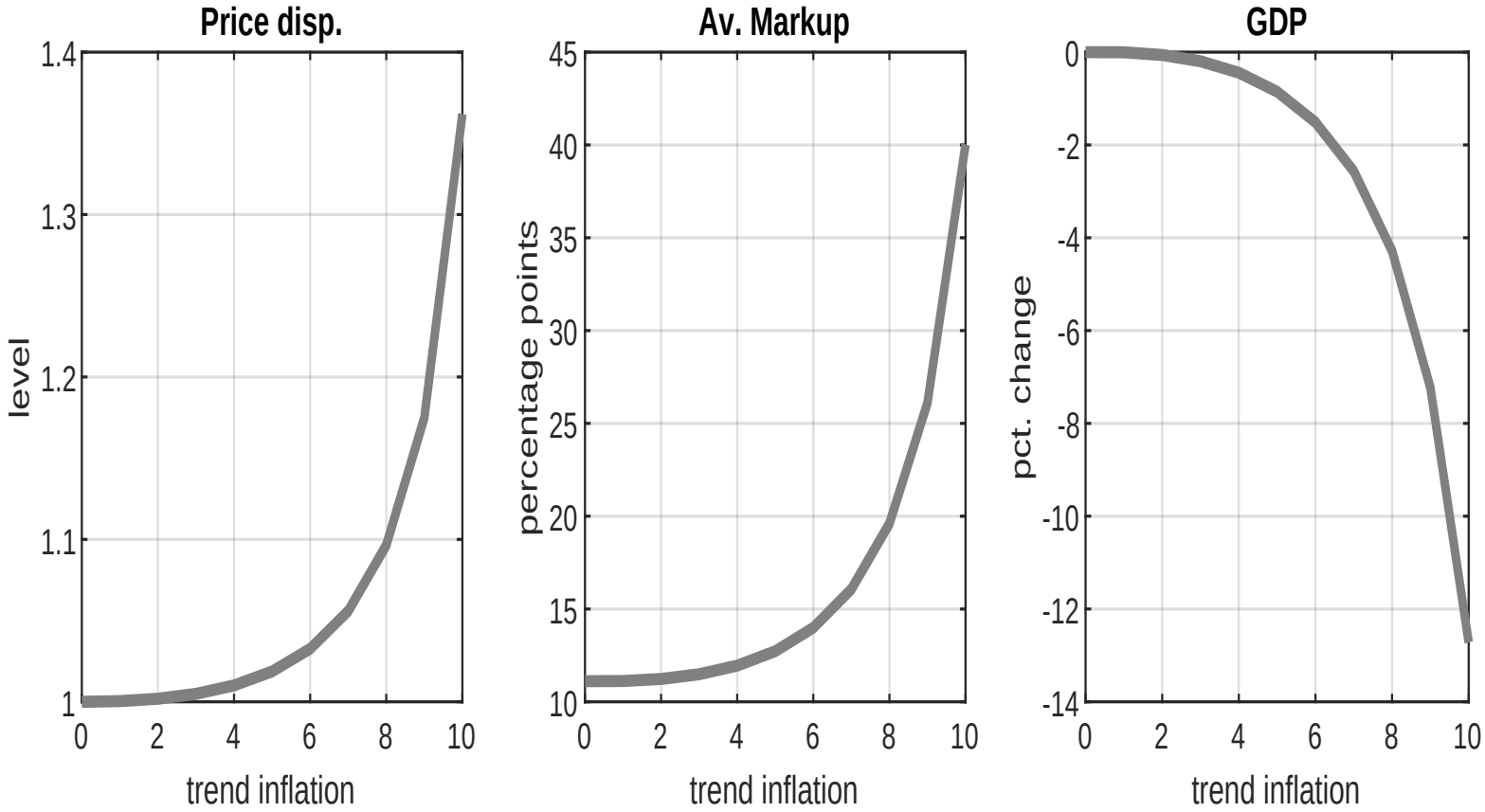
Results: Trend Inflation and the Real Economy (No Runs)

- Higher trend inflation operates *via* stronger **price dispersion** and **monopolistic distortions**.
- Stronger distortions lead to lower output, consumption, real wages.

Figure: Steady states for different trend inflations. No-run case

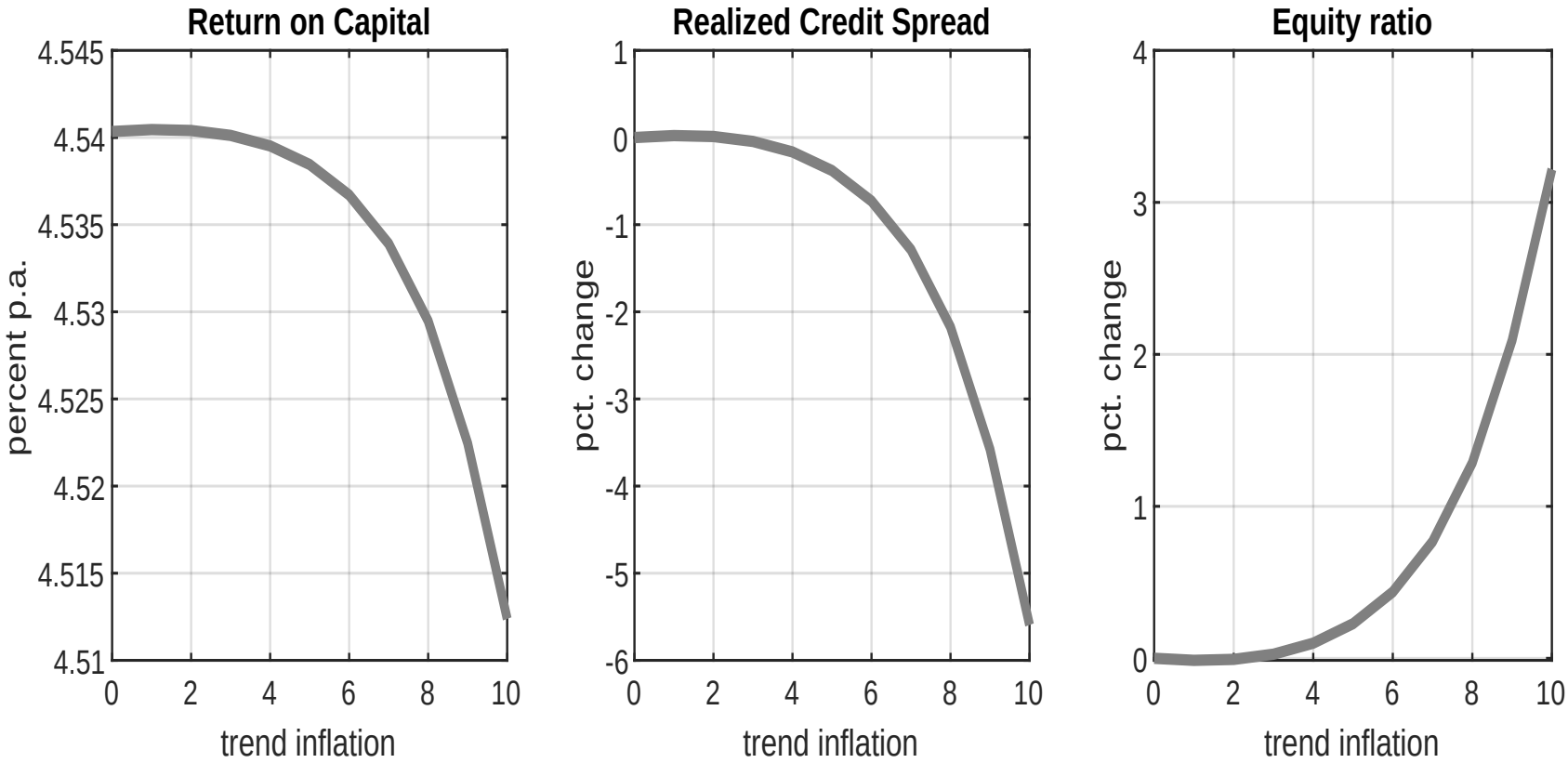


Notes: "pct. change" refers to the percentage deviation from the zero-inflation steady state.

Results: Trend Inflation and Financial Sector (No Runs)

- Higher trend inflation puts a drag on banks' balance sheets by *(i)* depressing asset prices and *(ii)* credit spreads.
- The drag on profitability/balance-sheets forces banks to deleverage.

Figure: Steady states for different trend inflations. No-run case

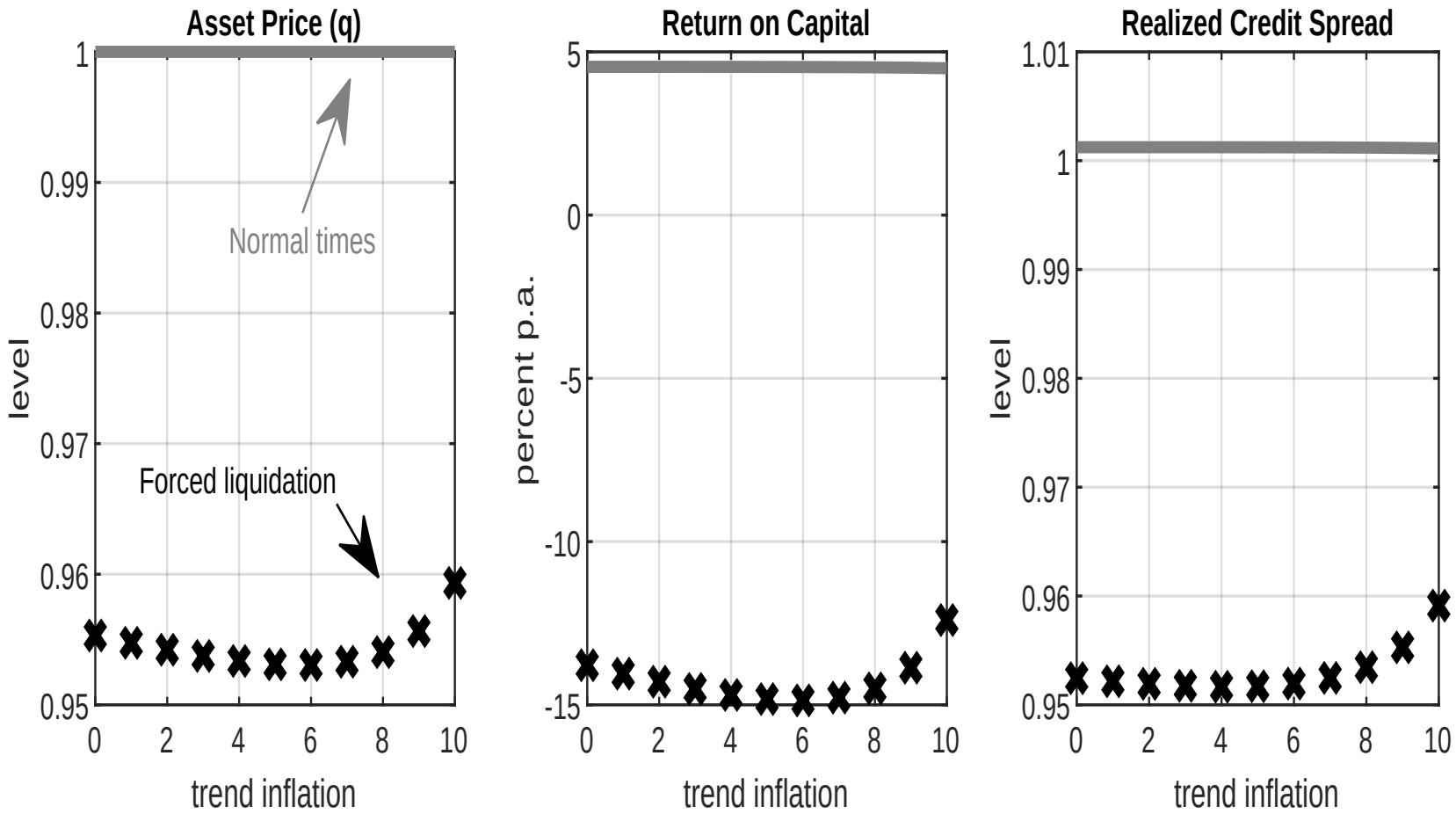


Notes: "pct. change" refers to the percentage deviation from the zero-inflation steady state.

Results: Forced Liquidation

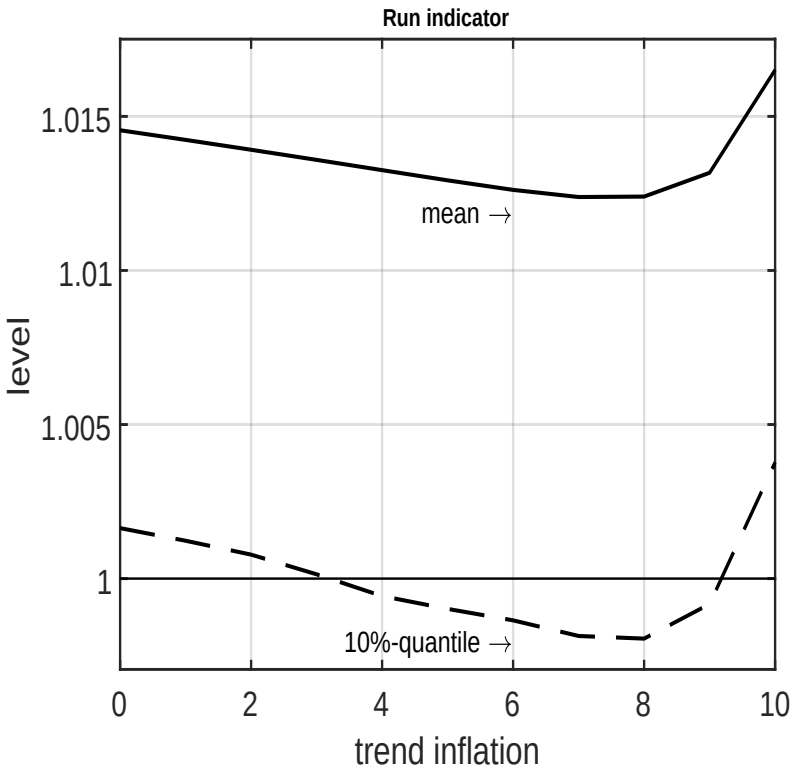
- Large drop in macro aggregates. Financial variables manly driven by liquidation asset price.
- Trend inflation first magnifies but then attenuates the drop in run asset price.

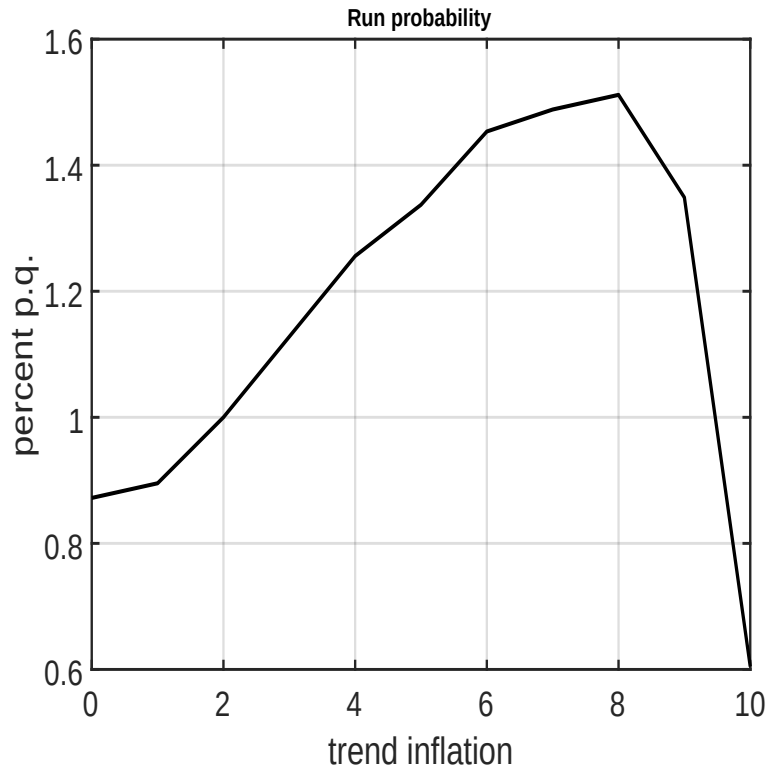
Figure: Trend inflation and the run



Notes: Steady state values at different levels of trend inflation. *Grey lines* refer to the no-run steady state. *Asterisk lines* correspond to the run equilibrium.

Results: Trend Inflation and Run Probability





Notes: Steady state values or percentage deviations from the zero inflation case ("pct. change") at different levels of trend inflation.

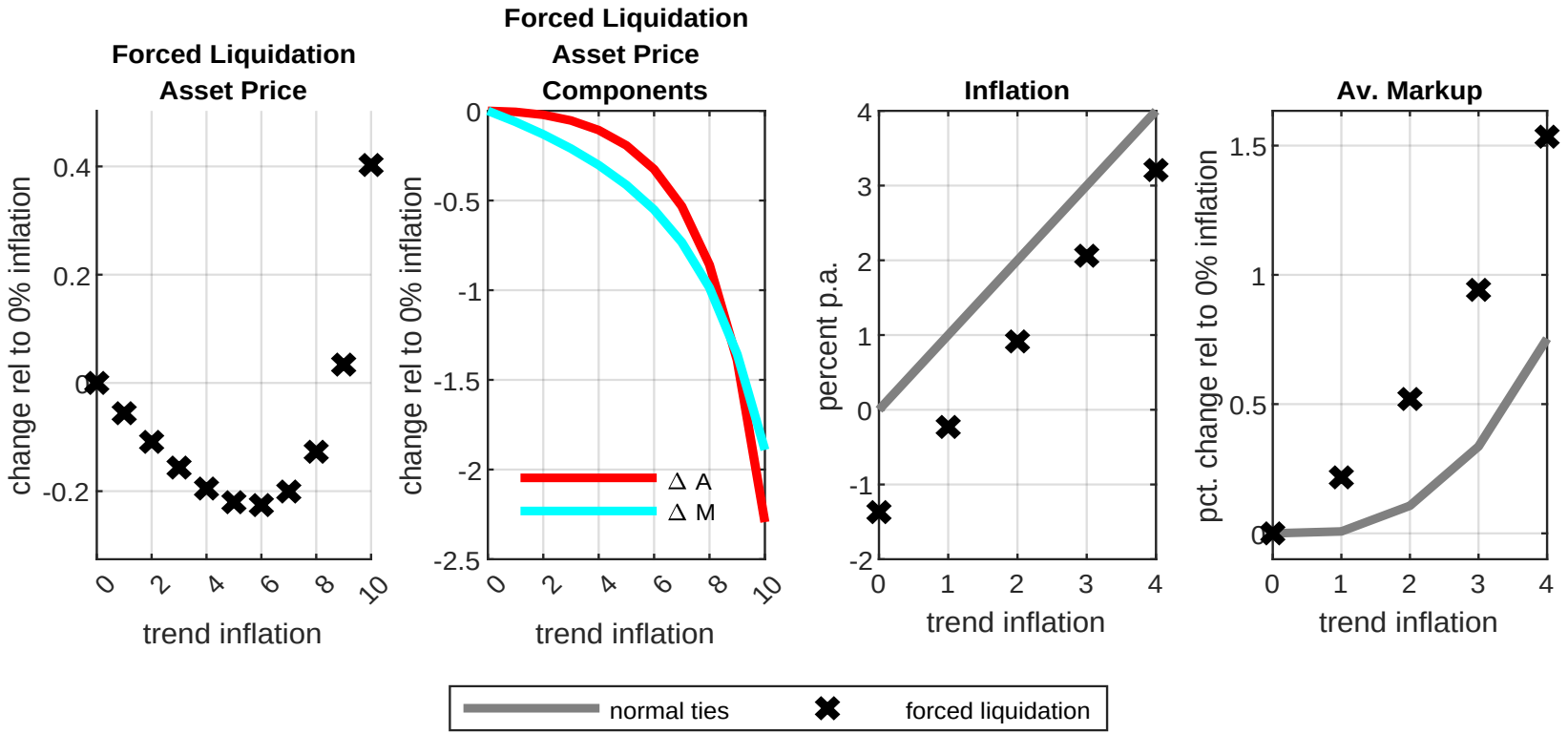
- Recall **"run indicator"**: $\mathbf{x}^* = \frac{R_t^{b,\star}}{R_t^{\star}} \frac{\phi_{t-1}}{\phi_{t-1}^{-1}} < \mathbf{1} \Rightarrow$ run *possible*; $\mathbf{x}^* \geq \mathbf{1} \Rightarrow$ run *not possible*;

Results: Details on the Mechanism

- Non-banks (households) Euler equation in a run:

$$q_t^\star = \overbrace{\beta E_t \left\{ \frac{u'(C_{t+1}^\star)}{u'(C_t^\star)} \left(z_{t+1}^\star + (1-\delta) q_{t+1}^\star \right) | \text{run in } t \right\}}^{\text{asset earnings (cyan line)}} - \overbrace{\frac{\gamma(1-\kappa)}{u'(C_t^\star)}}^{\text{intermediation inefficiency (red line)}}$$

Figure: Trend inflation and the run (mechanism)



Notes: "pct. change" refers to the percentage deviation from the zero inflation case. *Grey lines* refer to the no-run steady state. *Asterisk lines* correspond to the run equilibrium.

Conclusion

- We investigate the consequences of different trend inflation levels for the probability of banking crises within a DSGE model.
- Findings:
  - Bank run probability increases steeply as trend inflation rises from 0% to 6% p.a.
  - The run probability is hump shaped trend inflation.
- Macroprudential policy should be aware of the elevated fragility of the financial system if long run inflation turns to be higher than in the past.
- When discussing the pros and cons of different target/trend inflation rates, monetary policy makers should also take into account the potentially significant financial instability consequences.

Thank you for your attention!