Overview

- We study the link between present-biased households and monetary policy by endogenizing the present bias in a baseline New Keynesian (NK) model.
- Theoretically, we show that:
  - Higher (lower) present bias induces higher (lower) natural interest rate.
  - In its endogenized form, present bias depends on the relative risk aversion, the cognitive cost, and shock volatility.
  - Present bias introduces a new channel through which monetary policy stance could change abruptly following some disturbance.
- Empirically, we find that:
  - Data support a present-biased economy.
  - From the Great Moderation (GM) to the Global Financial Crisis (GFC), the present bias function shifted its behavior, becoming more responsive to economic dynamics (Tables 2 and 3).
  - This shift implies that, following a shock, the degree of present bias tends to decrease (i.e., the associated parameter tends to increase), implying a decrease in the natural interest rate. This provides a behavioral explanation of the decline in natural rates, which turns out to drive the ZLB.

Model

Households maximize their lifetime utility

$$U_t = u_t + m \sum_{k=1}^{\infty} \beta^k E_t u_{t+k}$$

where $\beta \in [0,1]$ is the static discount factor, $m \in [0,1]$ is the present bias parameter.

Exogenous present bias in a linear world.

Solving and linearizing around the steady state, the natural interest rate is

$$r^* = -\ln(\beta m) + \sigma E_t [y_t - y^*]$$

- Thus, $\frac{\partial r^*}{\partial m} = -\frac{1}{m} > 0$: higher (lower) present bias yields to higher (lower) natural interest rate in the economy.

Endogenous present bias

Following Gabaix (2014), we derive the endogenous present bias function

$$m_t = \left( 1 + \frac{\chi}{\Lambda_t} \right)^{-1}$$

where $\chi$ is a cognition cost parameter ($\chi = 0$ corresponds to the rational case), and $\Lambda_t$ is a function of model parameters and state vector variances (see the paper for more details).

- The rest of the model is the usual Phillips Curve, and the Euler Equation is modified such as:

$$1 = \beta m_t R_t E_t \left[ u_{t+1} P_{t+1} \over u_{t+1} P_t \right]$$

- The model is closed with a standard inertial Taylor rule.

Optimal Monetary Policy

- Commitment policy requires the policymaker to maximize the welfare of the economy defined as the lifetime utility of the representative agent such that

$$W_t = u(C_t, N_t) + \beta W_{t+1}$$

- Due to the endogeneity of the present bias function $m$, households become more aware following a price markup shock.
- Under commitment, the central bank reacts quickly and aggressively to counteract the tightening stance, as implied by the change in the present bias.

Bayesian Estimation

- Data confirm that $\chi > 0$ (significantly) for all samples.

<table>
<thead>
<tr>
<th>Prior mean</th>
<th>Post. mean</th>
<th>Interval</th>
<th>Distribution</th>
<th>Prior std.</th>
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</thead>
<tbody>
<tr>
<td>$\rho_t$</td>
<td>0.8</td>
<td>0.720</td>
<td>0.694 - 0.743</td>
<td>beta</td>
</tr>
<tr>
<td>$\phi_w$</td>
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<td>2.584</td>
<td>2.554 - 2.613</td>
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<tr>
<td>$\phi_y$</td>
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<td>0.057</td>
<td>0.050 - 0.064</td>
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<td>$\chi$</td>
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<td>0.427</td>
<td>0.393 - 0.463</td>
<td>unif</td>
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</tbody>
</table>

- Table 1 Estimates - Full Sample 1975-2019

<table>
<thead>
<tr>
<th>Prior mean</th>
<th>Post. mean</th>
<th>Interval</th>
<th>Distribution</th>
<th>Prior std.</th>
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</thead>
<tbody>
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<tr>
<td>$\phi_y$</td>
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<td>0.060</td>
<td>0.050 - 0.072</td>
<td>norm</td>
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<tr>
<td>$\chi$</td>
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<td>0.446</td>
<td>0.338 - 0.566</td>
<td>unif</td>
</tr>
</tbody>
</table>

- Table 2 Estimates - GM (1975-2006)

- Table 3 Estimates - Post GFC (2007-2019)

The Estimated Impulse Response Functions

- A technology shock highlights how present bias became responsive to shocks in the aftermath of the GFC.

- A price markup shock induces less pronounced dynamics for output and prices after the GFC, except for the present bias.

- Figure 3: Price Markup Shock

Discussion and Conclusion

- We construct a nonlinear NK model with an endogenized present bias.
- We estimate the model and the present bias microfoundations in a DSGE set up in contrast to the empirical literature using partial equilibrium or experimental approaches.
- We show that data confirm that households are present biased, and that the model is not observationally equivalent to the standard model (Barro, 1999).
- We provide a behavioral explanation of the observed decline in natural interest rates, accelerated since the GFC.

This presentation does not necessarily reflect the views of the Bank of Israel, the International Monetary Fund, or any other institution.