How to Solve the Price Puzzle?

A Meta-Analysis

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Outline

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Definition of the Price Puzzle

- The central bank increases the interest rate:
  - Prices should fall.
  - × But a half of all empirical studies show otherwise.
- Price puzzle—the short-run increase in prices after monetary tightening.

→ Explanation 1: Caused by the cost channel (real increase in prices).

→ Explanation 2: Caused by omitted variables (econometric misspecifications).

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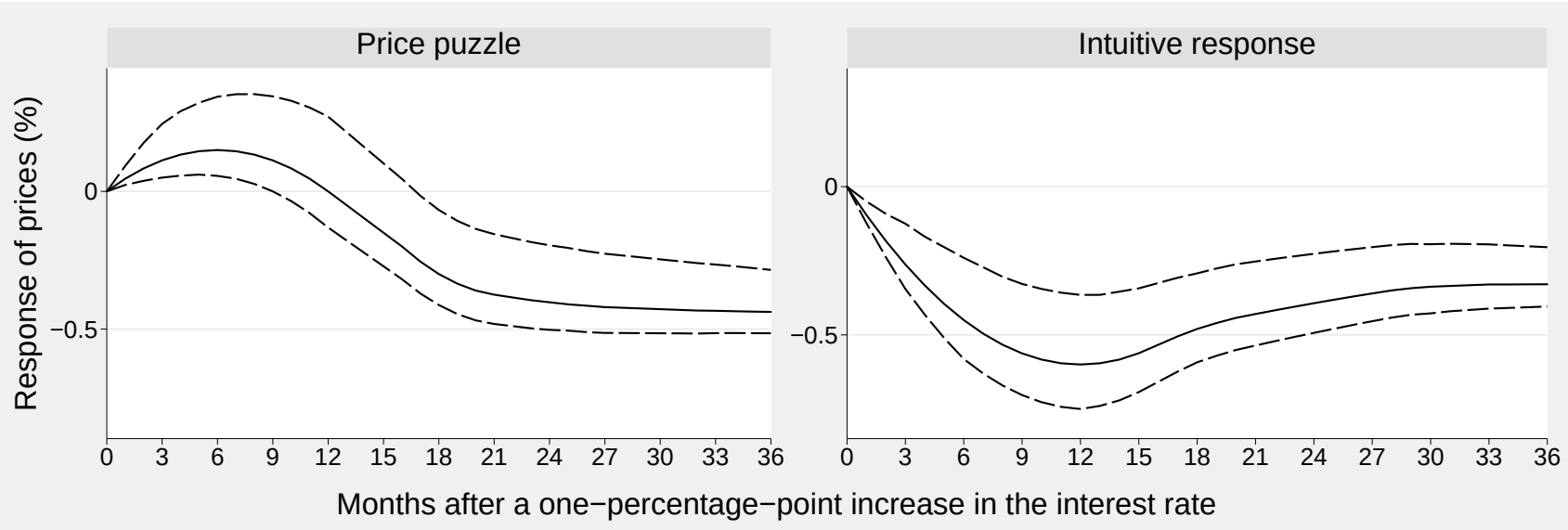
Estimating the Effects of Monetary Policy

- Workhorse tool: vector autoregression (VAR).
- Results reported graphically → impulse response functions.



Meta-Analysis: More than a Literature Survey

Meta-Analysis

We collect available impulse responses and ask:

1. What is the average response of prices to monetary tightening?
2. Do results systematically depend on the methodology?
3. If so, what is the average response implied by best-practice methodology?

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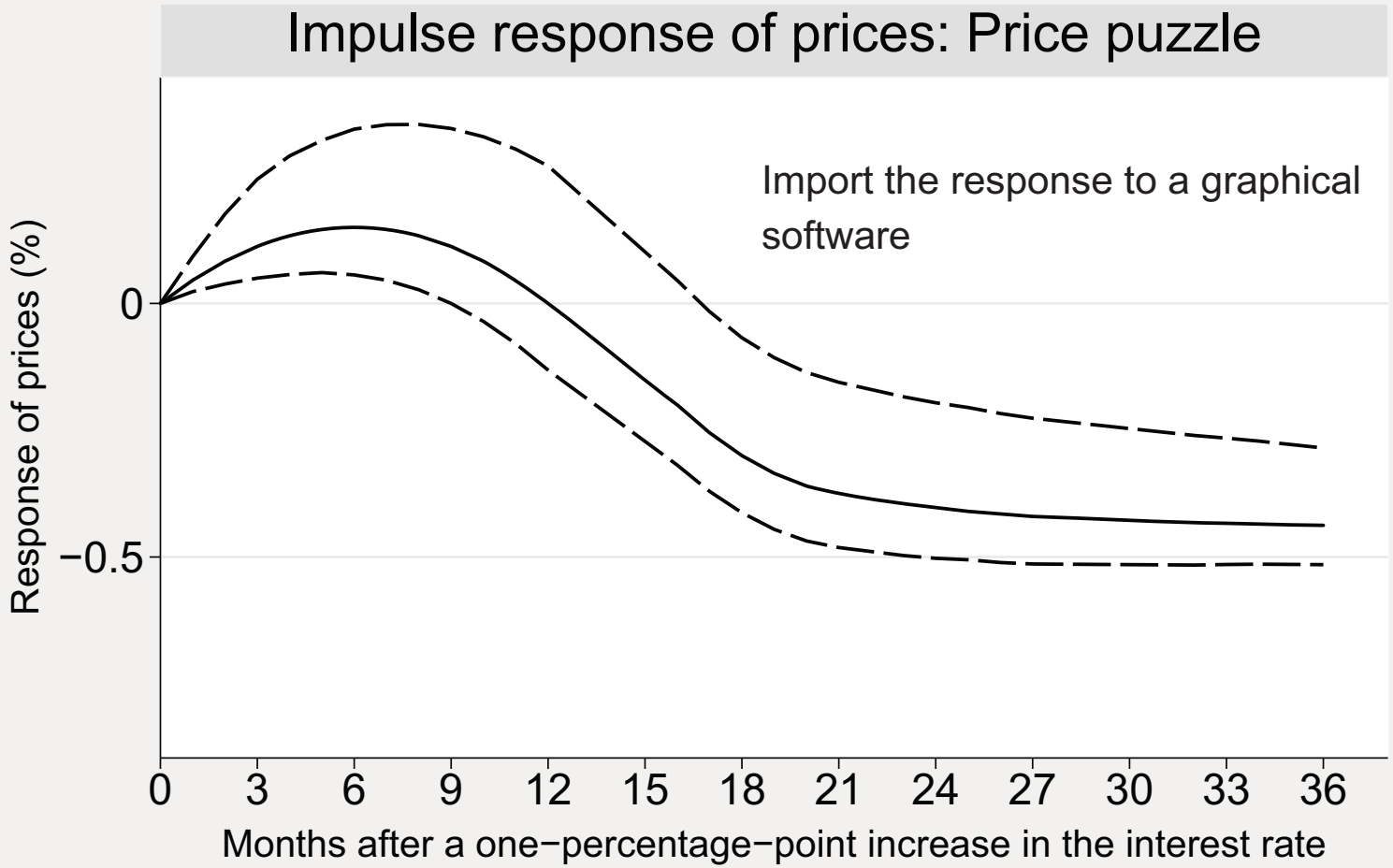
Coding of Impulse Responses



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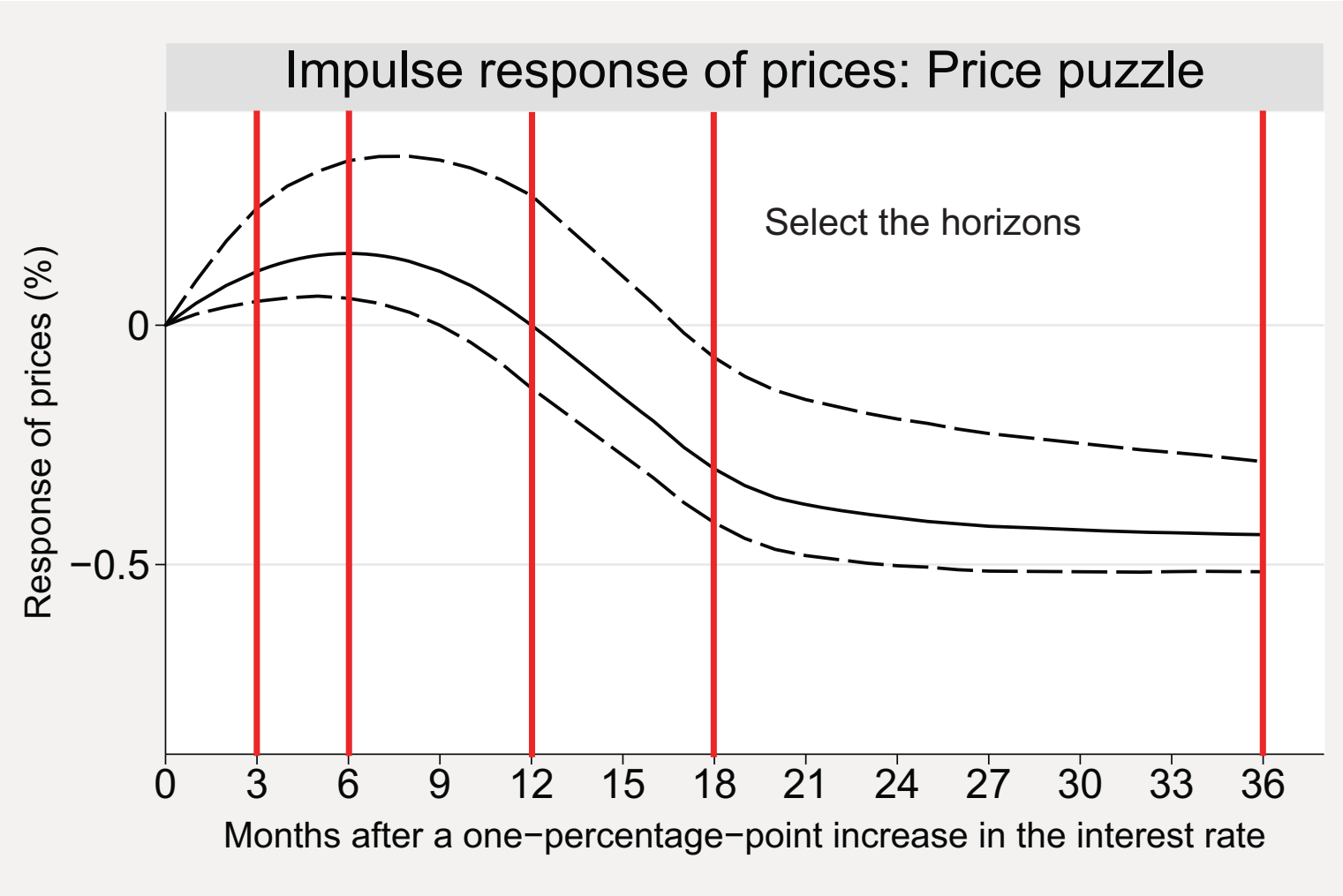

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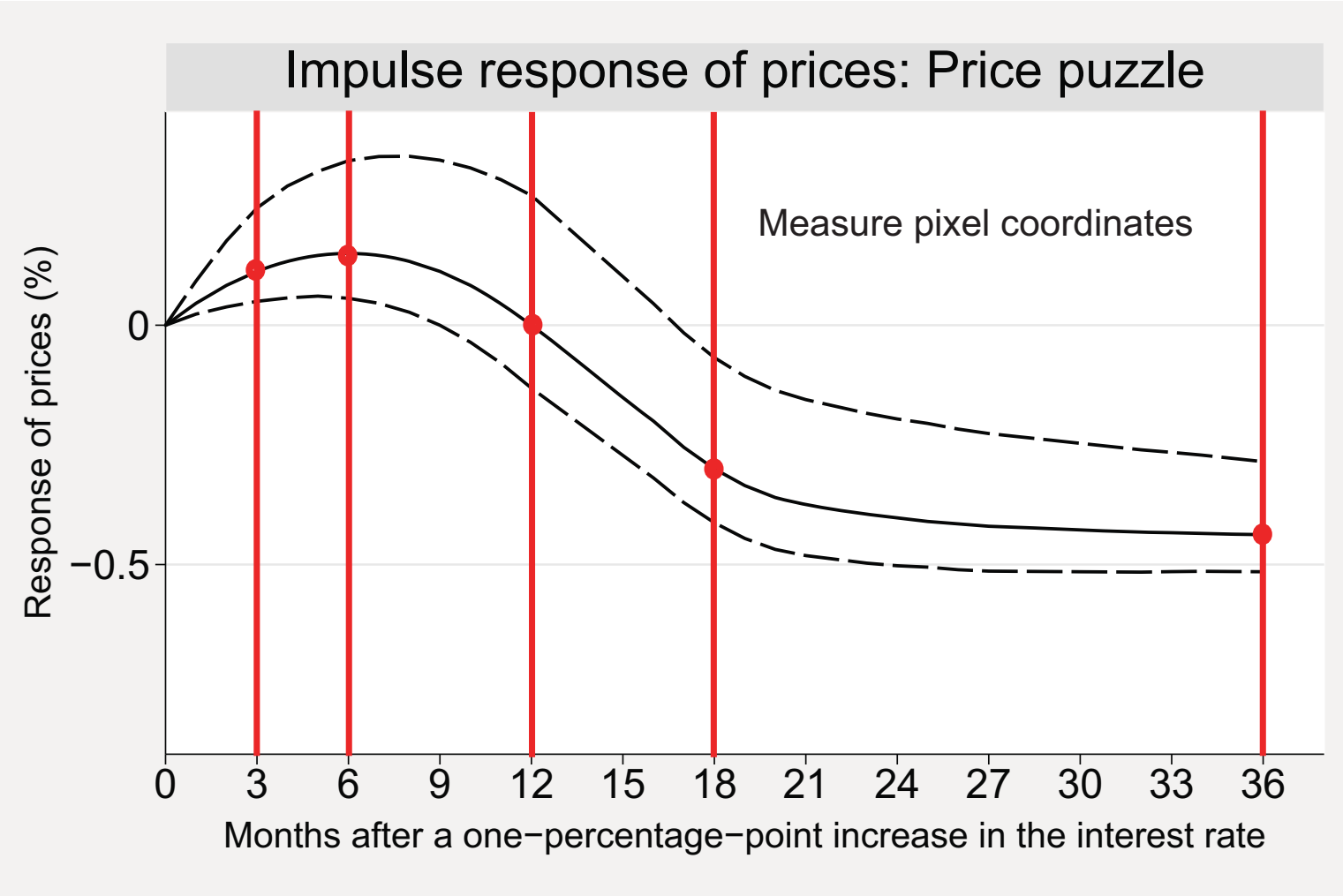

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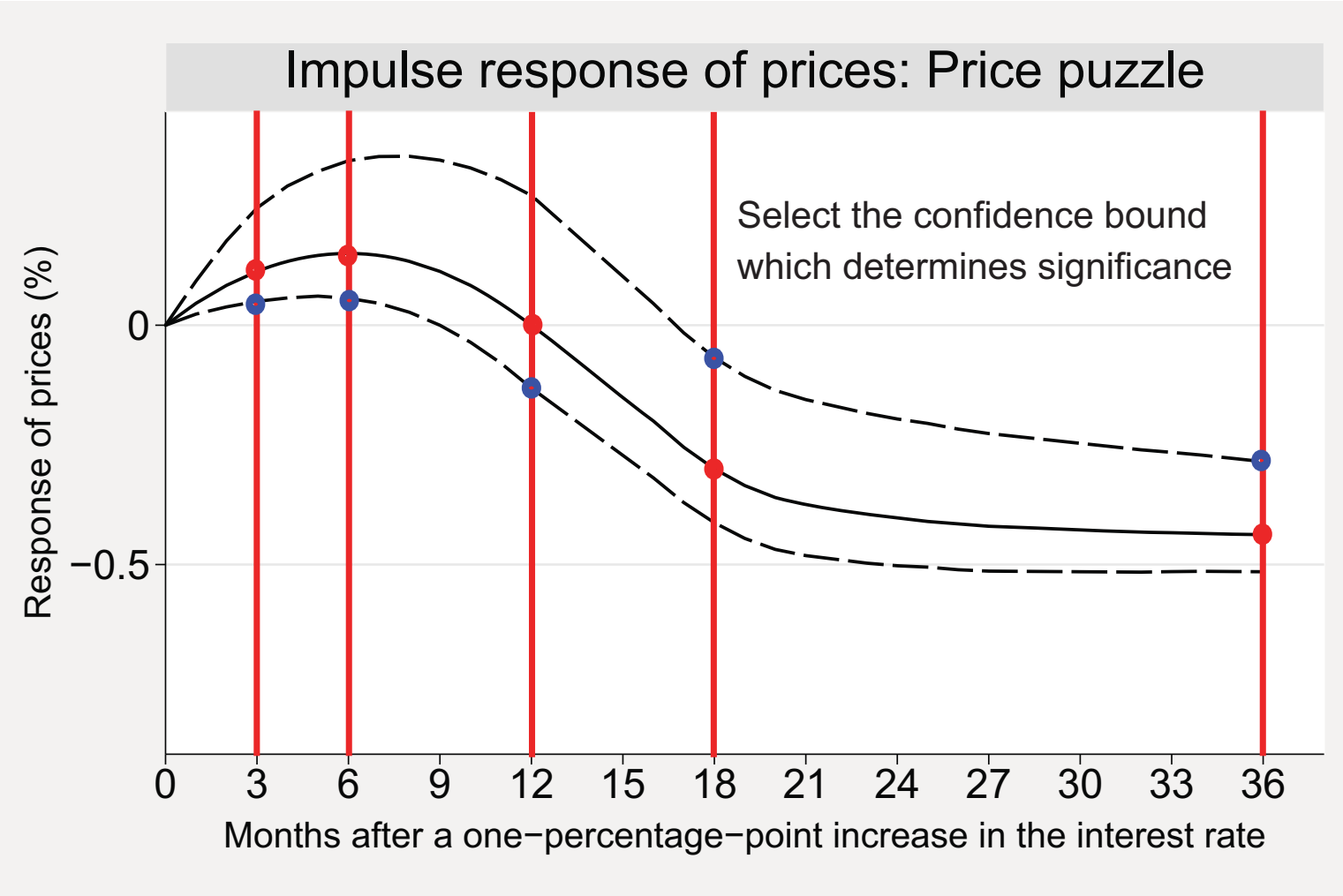

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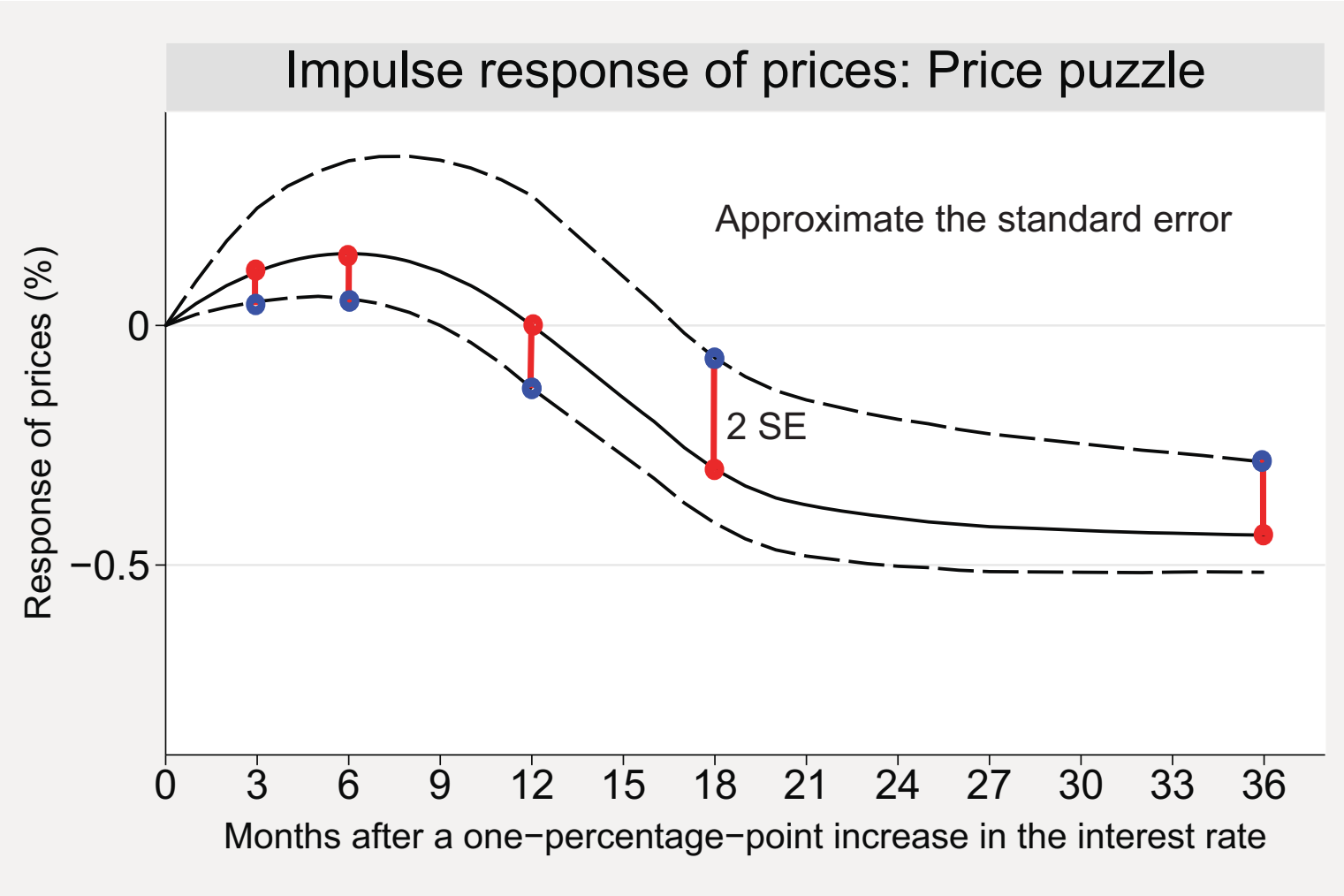

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Data Properties

- We collected published papers using VARs to estimate the effects of a shock to the interest rate on the price level.

→ 70 articles contained all necessary information.

- We use all impulse responses: more than 1,000 estimates collected.
- Evidence on 31 countries produced by 103 researchers.

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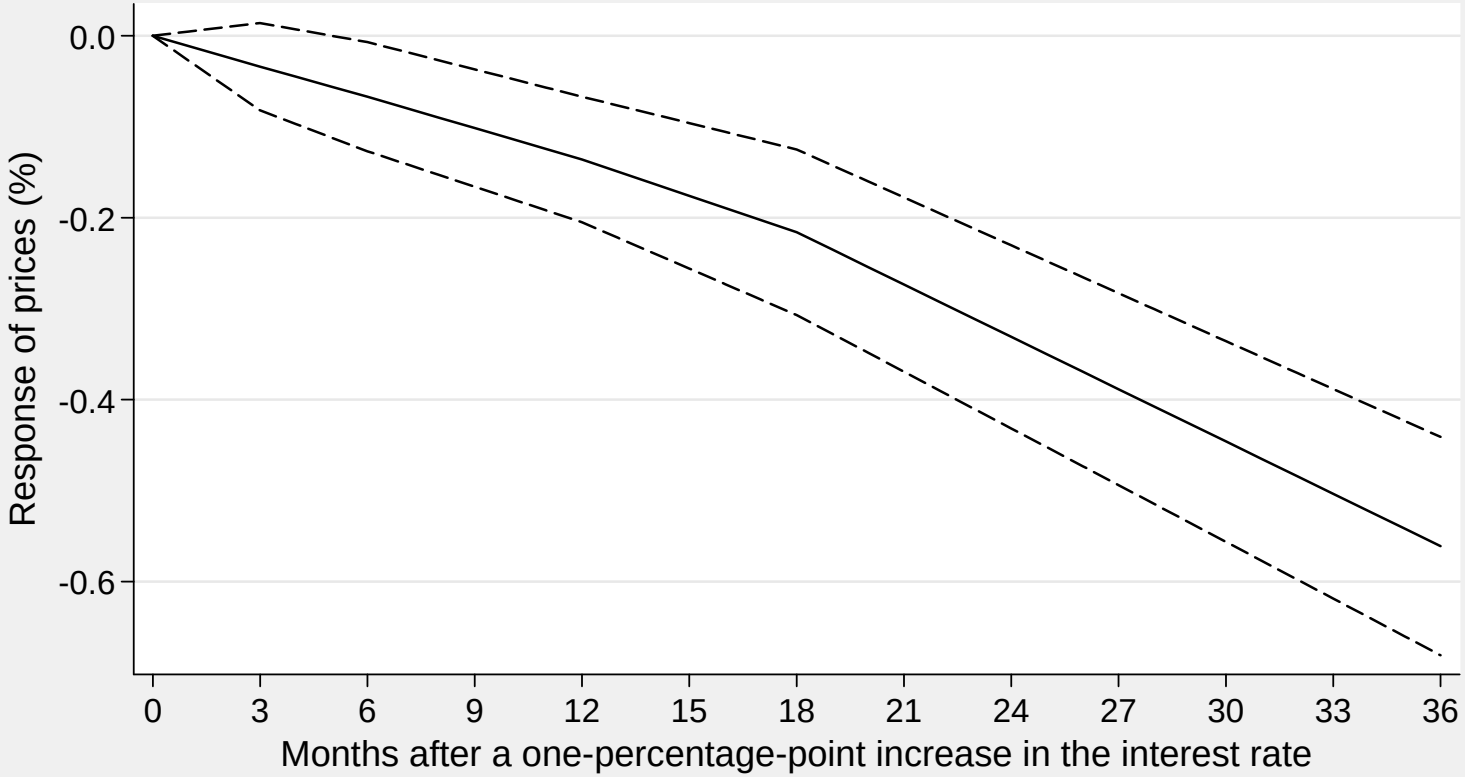
Average Impulse Response: Slow Transmission



Note: Confidence bands are constructed as +/- one standard error.

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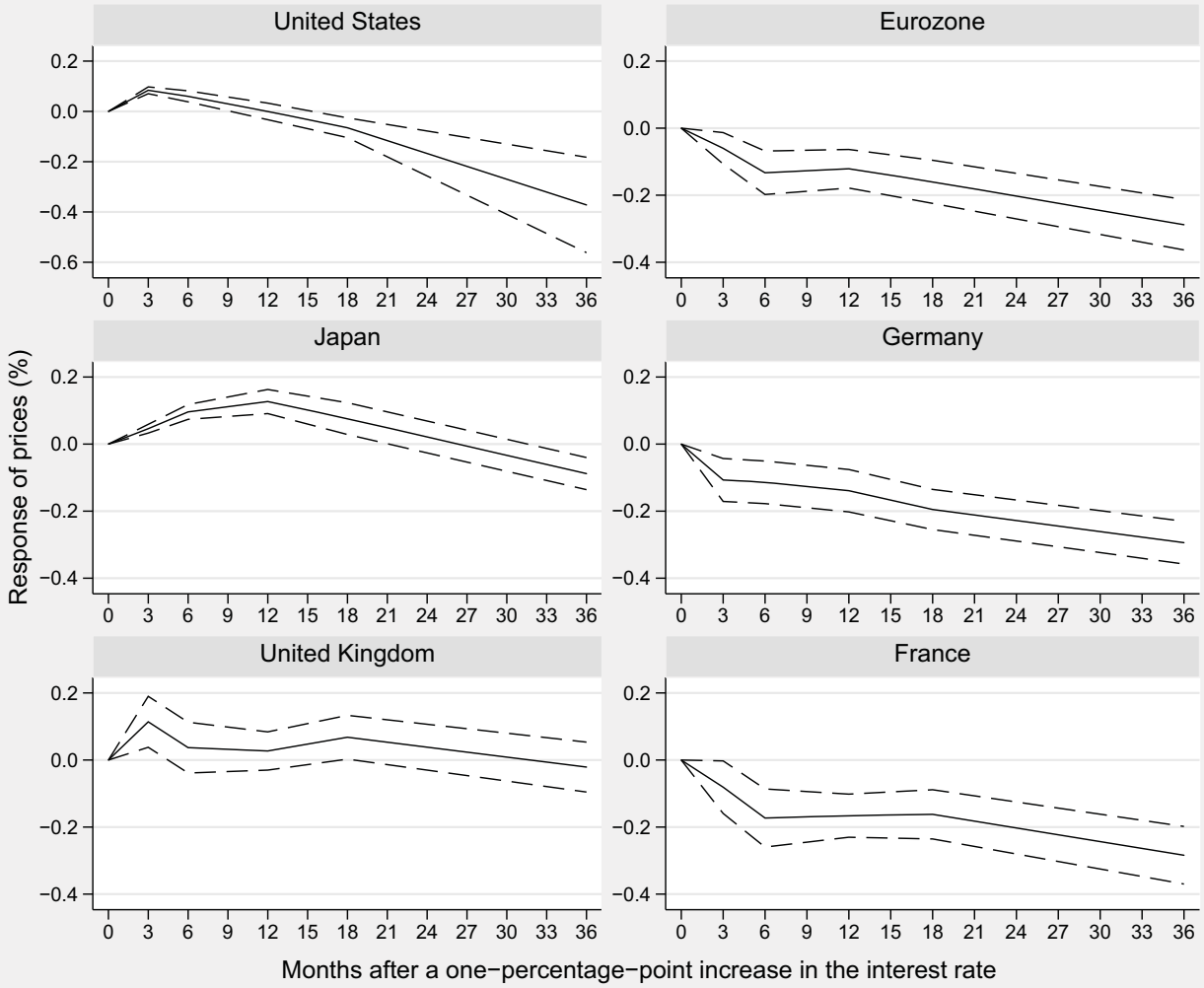
Monetary Transmission Differs Across Countries.



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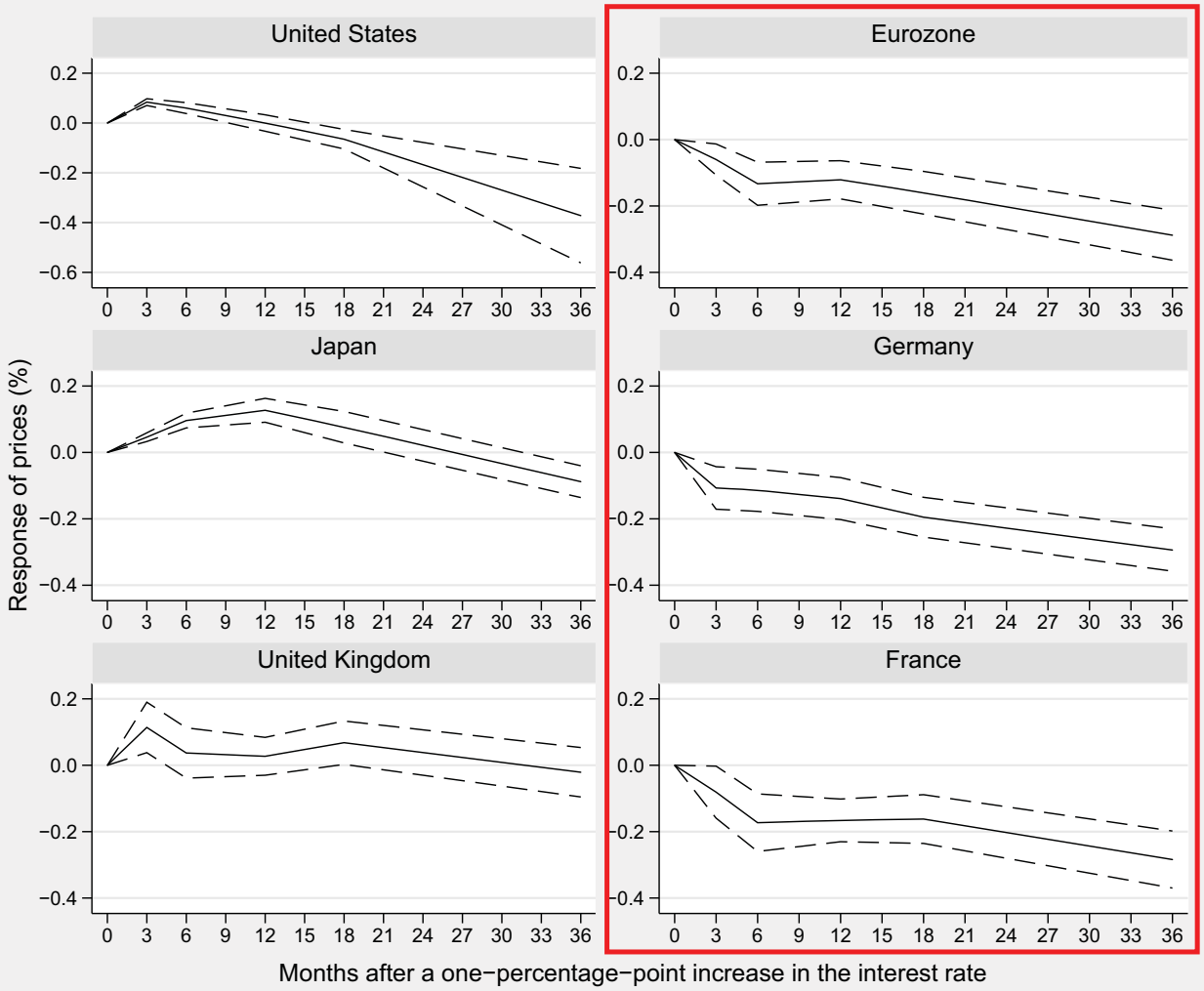

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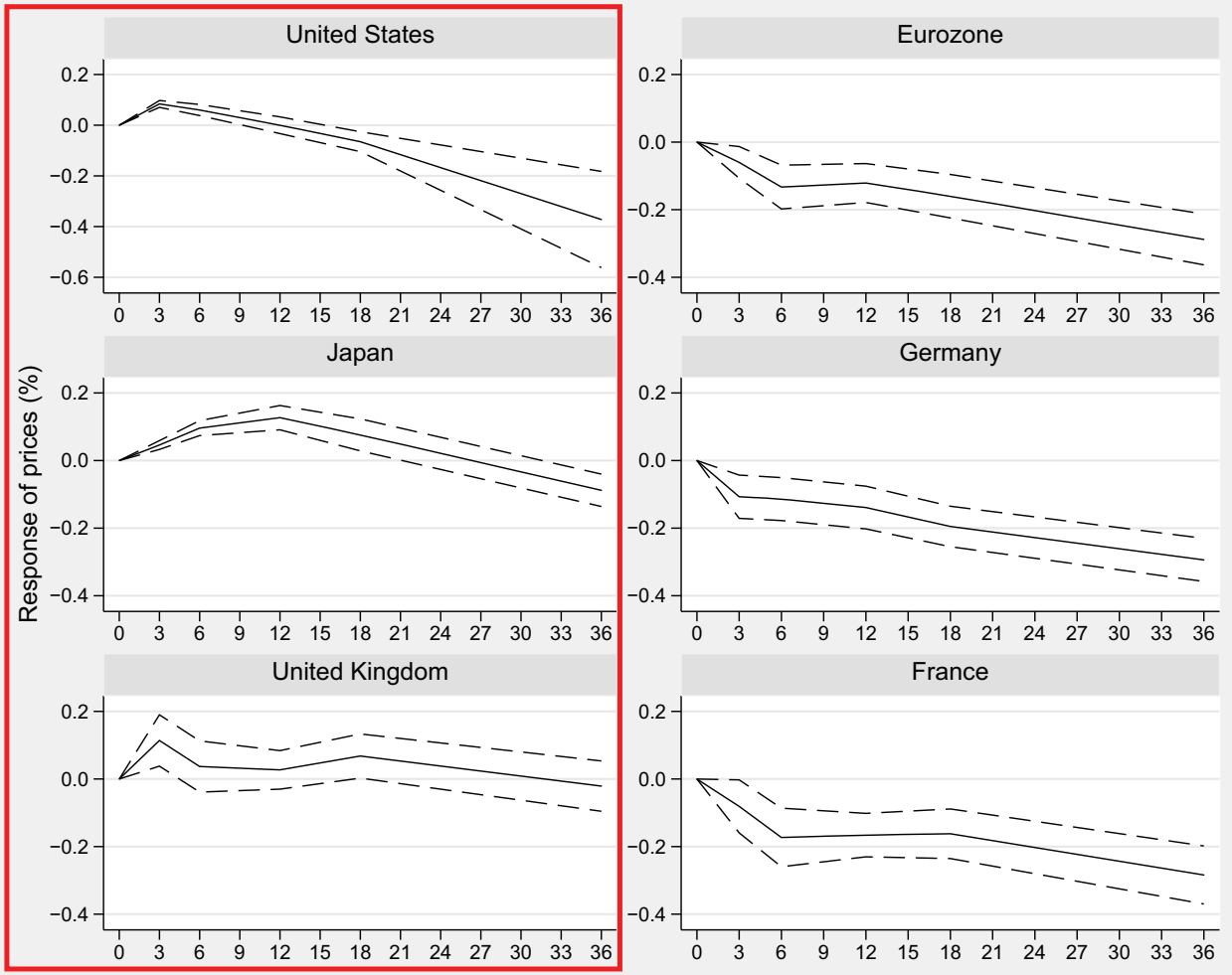

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Country Heterogeneity

Why cross-country differences? For example:

1. High average inflation $\rightarrow$ the effect of monetary policy on prices gets weaker (lower credibility).
2. High openness $\rightarrow$ the effect on prices gets stronger (exchange rate channel).
3. High central bank independence $\rightarrow$ the effect on prices gets stronger (higher credibility).

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Method Heterogeneity

Some methods may cause the price puzzle.
Literature suggests:

1. Omitted commodity prices (no forward-looking element).
2. GDP used instead of output gap (no information about potential output).
3. Recursive identification used instead of a structural VAR (consistence with theory).

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What Explains Different Responses?

Meta-regression analysis

- Regress the collected responses ($\hat{e}_{ij}$) on method and country characteristics (X_{kij}).
- Control for dependence within studies j (mixed-effects weighted least squares).
- Correct for publication bias.

$$\hat{e}_{ij} = \underbrace{e}_{\text{response}} + \underbrace{\sum_k \beta_k X_{kij}}_{\text{heterogeneity}} + \underbrace{\beta_0 SE_{ij}}_{\text{publication bias}} + \mu_{ij}.$$

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It Depends on the Horizon.

Results: short vs. long run

- Method heterogeneity $\rightarrow$ short-run response.
  - Misspecifications contribute to the price puzzle.
- Country heterogeneity $\rightarrow$ long-run response.
  - Signs for country-level variables are consistent with the above-mentioned intuition.

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Definition of Best Practice

From the meta-regression:

- Misspecifications systematically influence the results.
- The number of observations and age of data are important.

→ Let's use this information to improve our estimate of average impulse response.

- Plug in sample maximums for the number of observations, new data, . . . , control for all well-known misspecifications.

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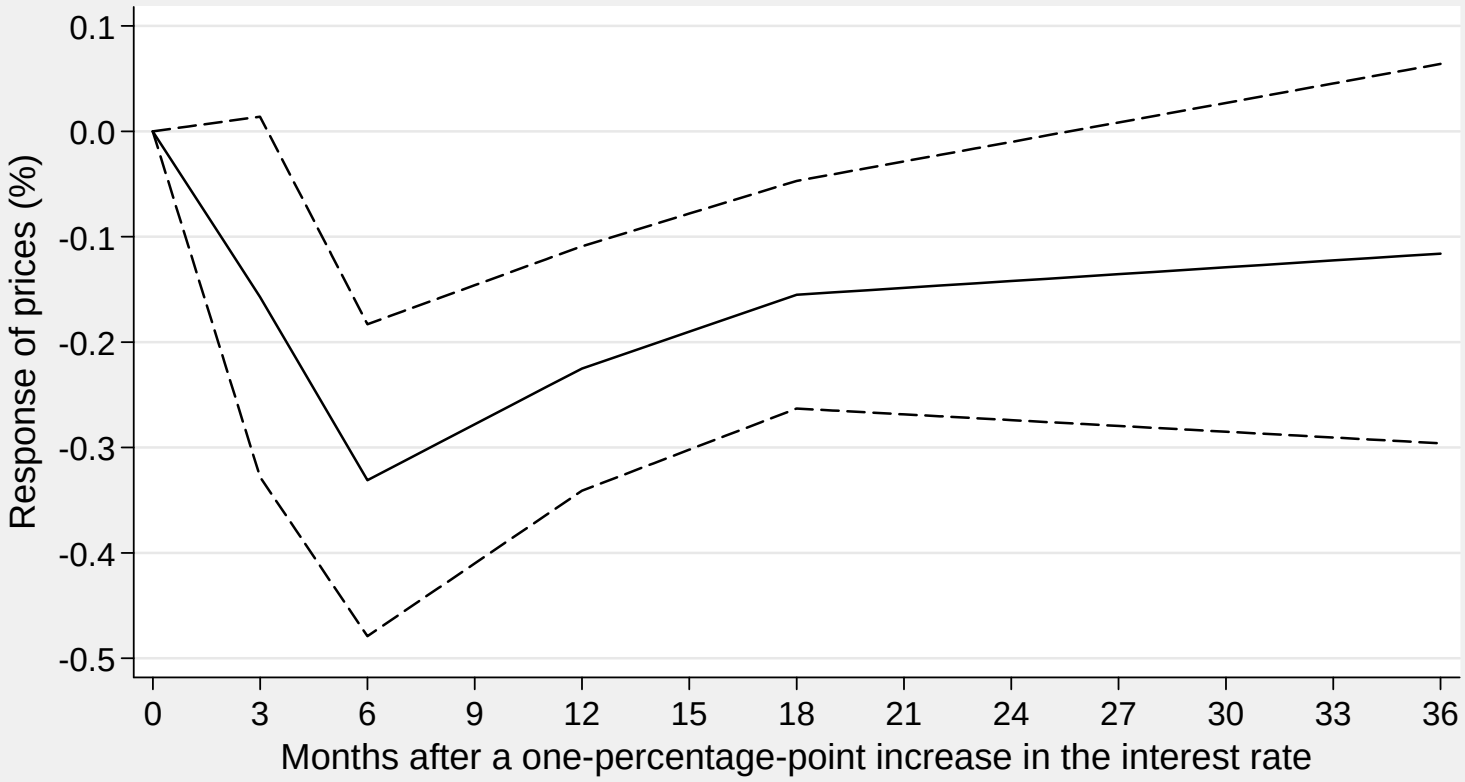
Best-Practice Impulse Response: Fast Transmission



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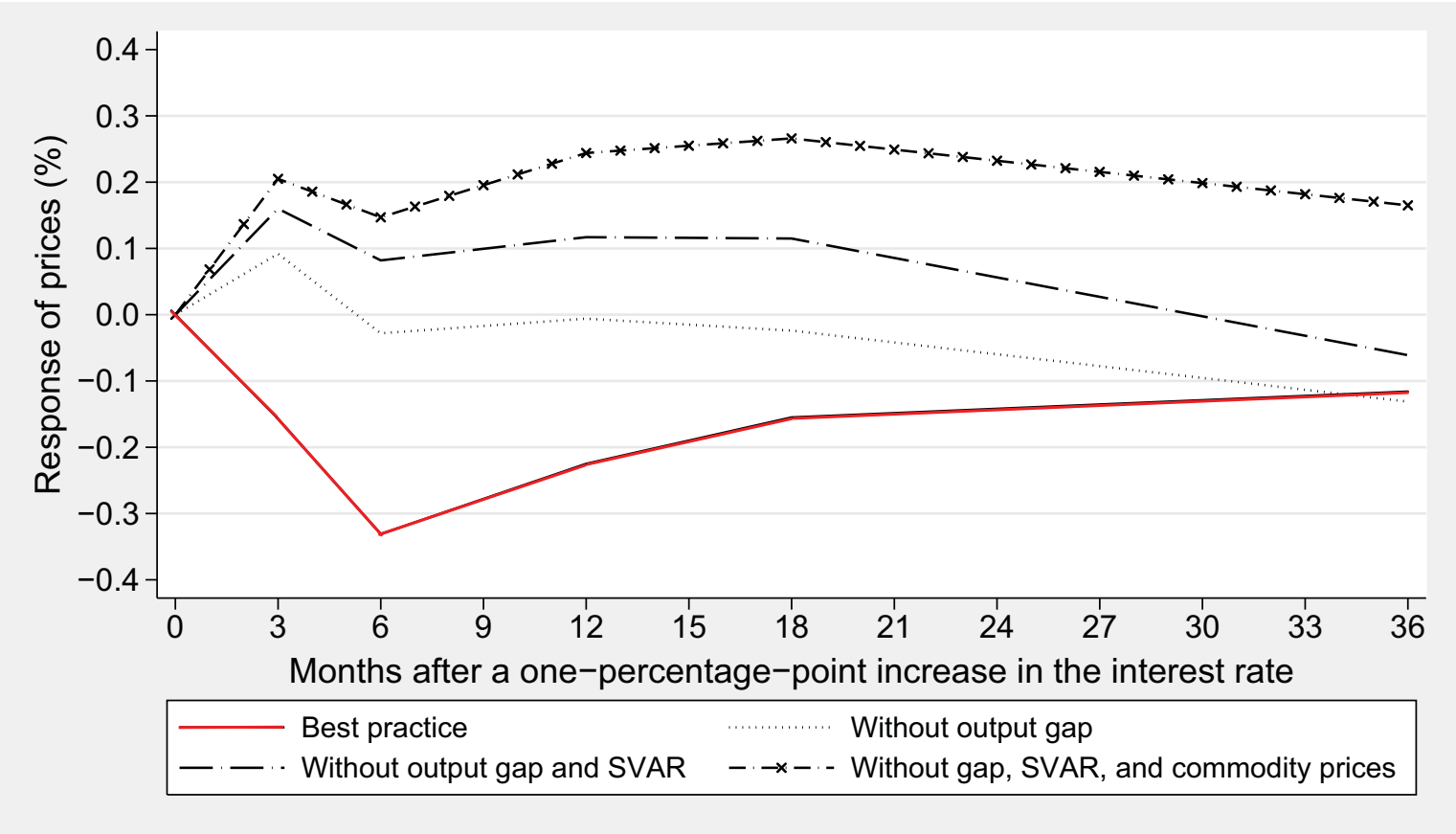
Misspecifications Cause the Price Puzzle.



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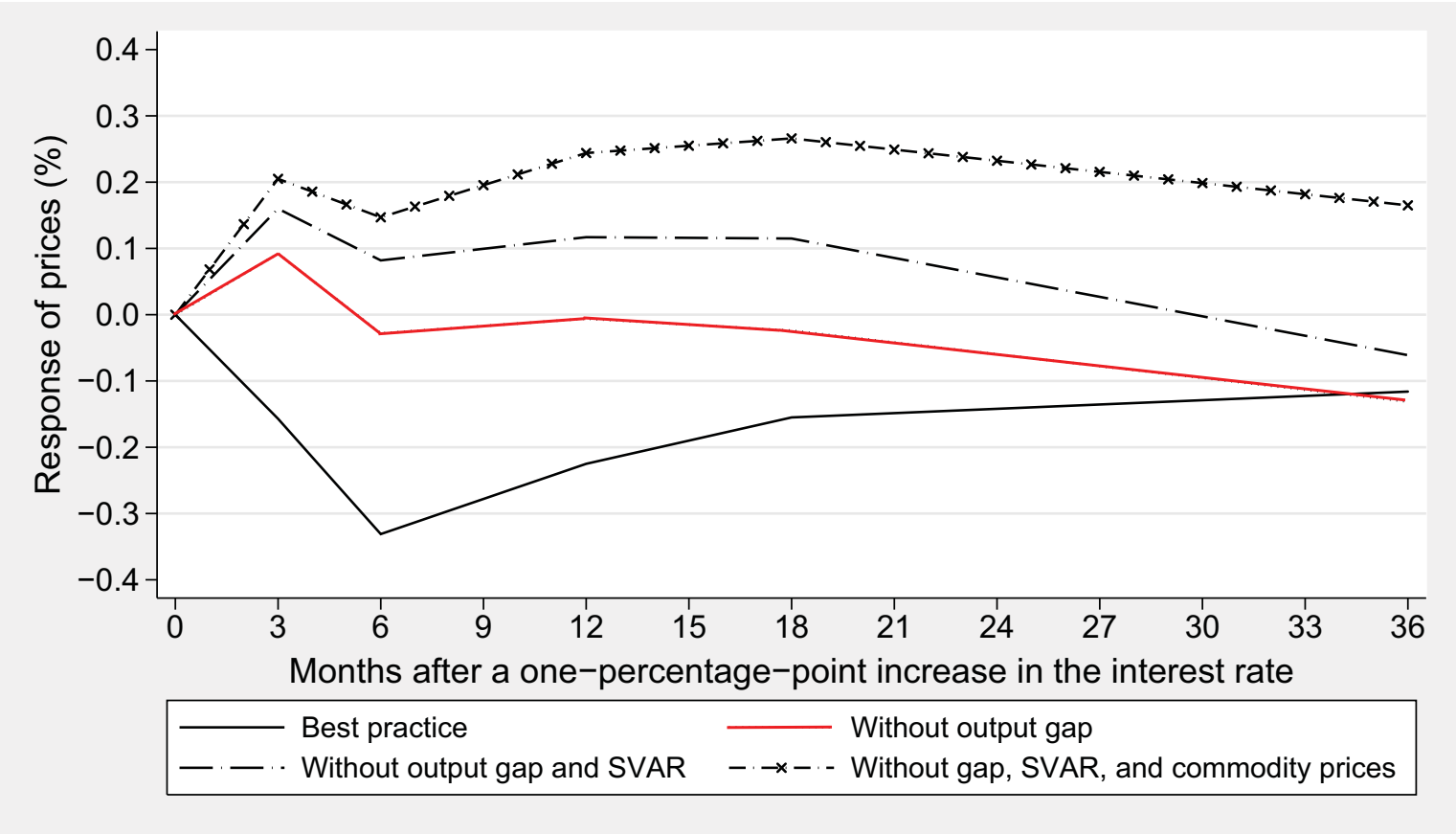

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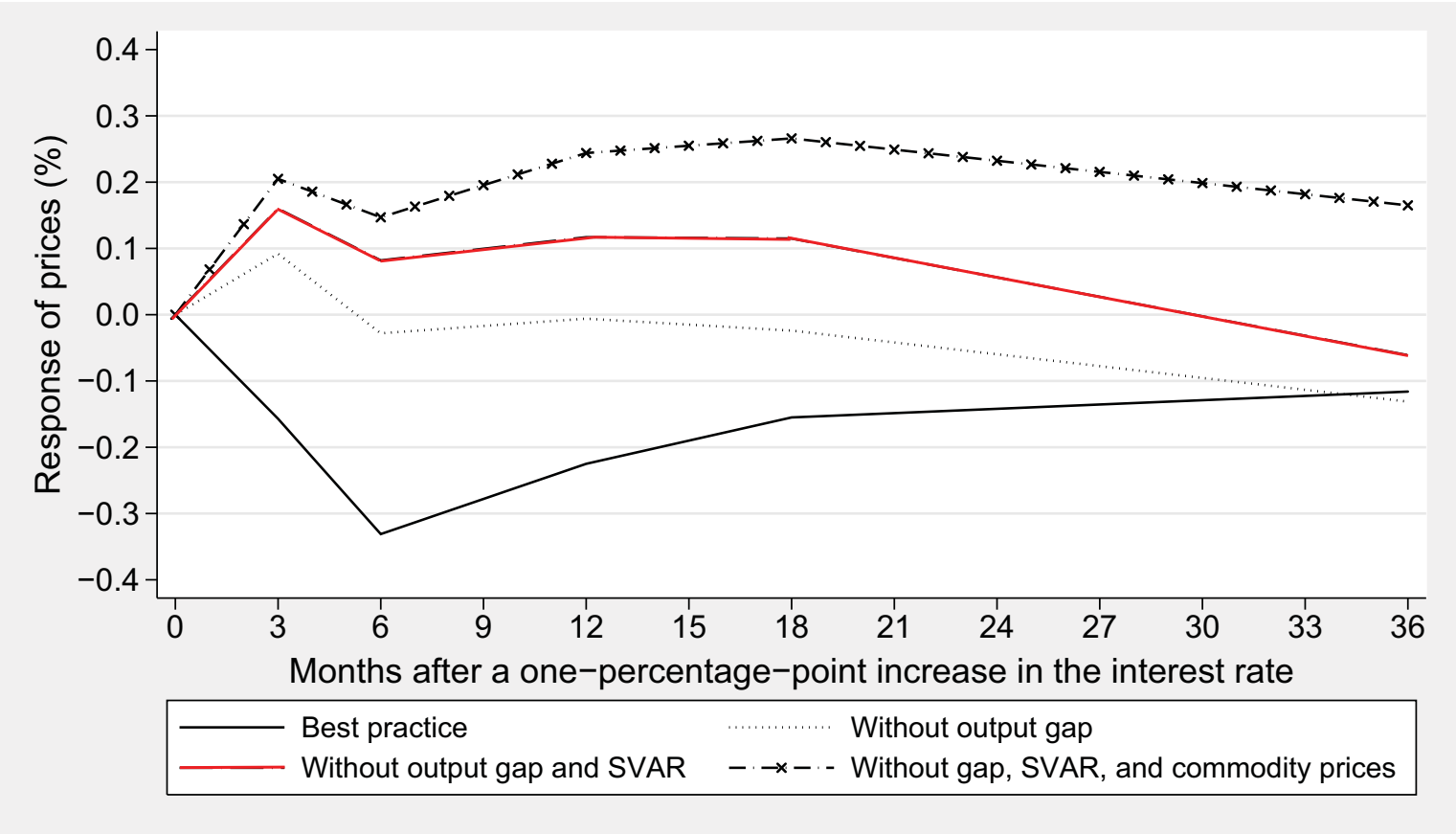

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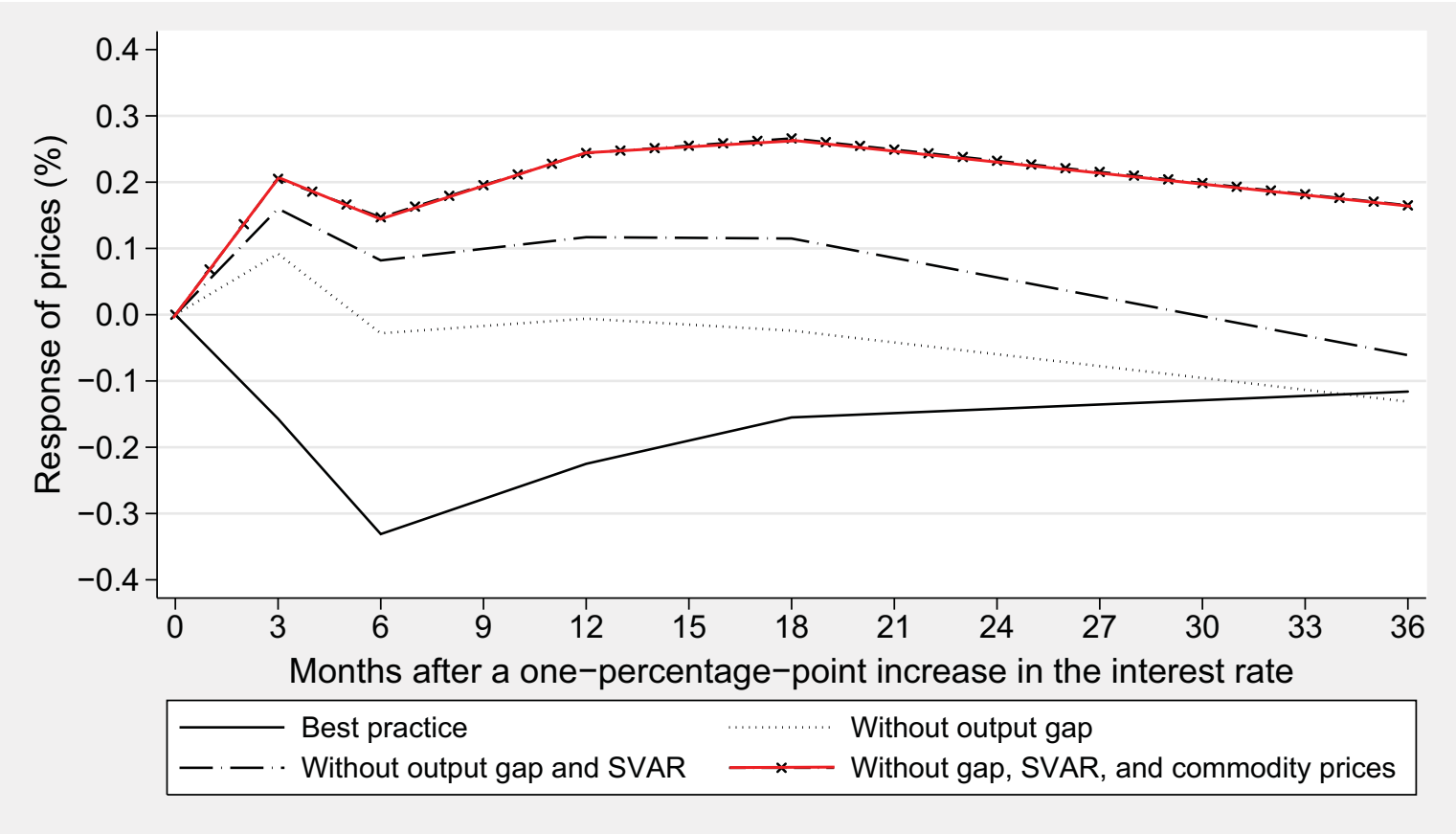

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Conclusion

Main Findings

1. The price puzzle in the short run is due to misspecifications.
2. The long-run response of prices is driven by country-specific characteristics.
3. On average, the transmission of monetary policy shocks seems to be fast.

Project Website

www.meta-analysis.cz/price_puzzle

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Interested in Meta-Analysis?


Borenstein, M., L. V. Hedges, J. P. T. Higgins & H. R. Rothestein (2009): Introduction to Meta-Analysis.
Wiley, 1st. edition.


Disdier, A.-C. & K. Head (2008): The Puzzling Persistence of the Distance Effect on Bilateral Trade.
The Review of Economics and Statistics **90(1)**: pp. 37–48.


Card, D., J. Kluve, & A. Weber (2010): Active Labour Market Policy Evaluations: A Meta-Analysis.
The Economic Journal **120(548)**: pp. F452–F477.

Reading list on RePEc: ideas.repec.org/k/metaana.html

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