Digitalization: *selected* macroeconomic features

- **Routinization**
  - Concomitant with increased EOS between K and (some types of) L

- **Falling relative price of capital goods**
  - > 0.5% per year in AEs, interacts with increased pace of routinization

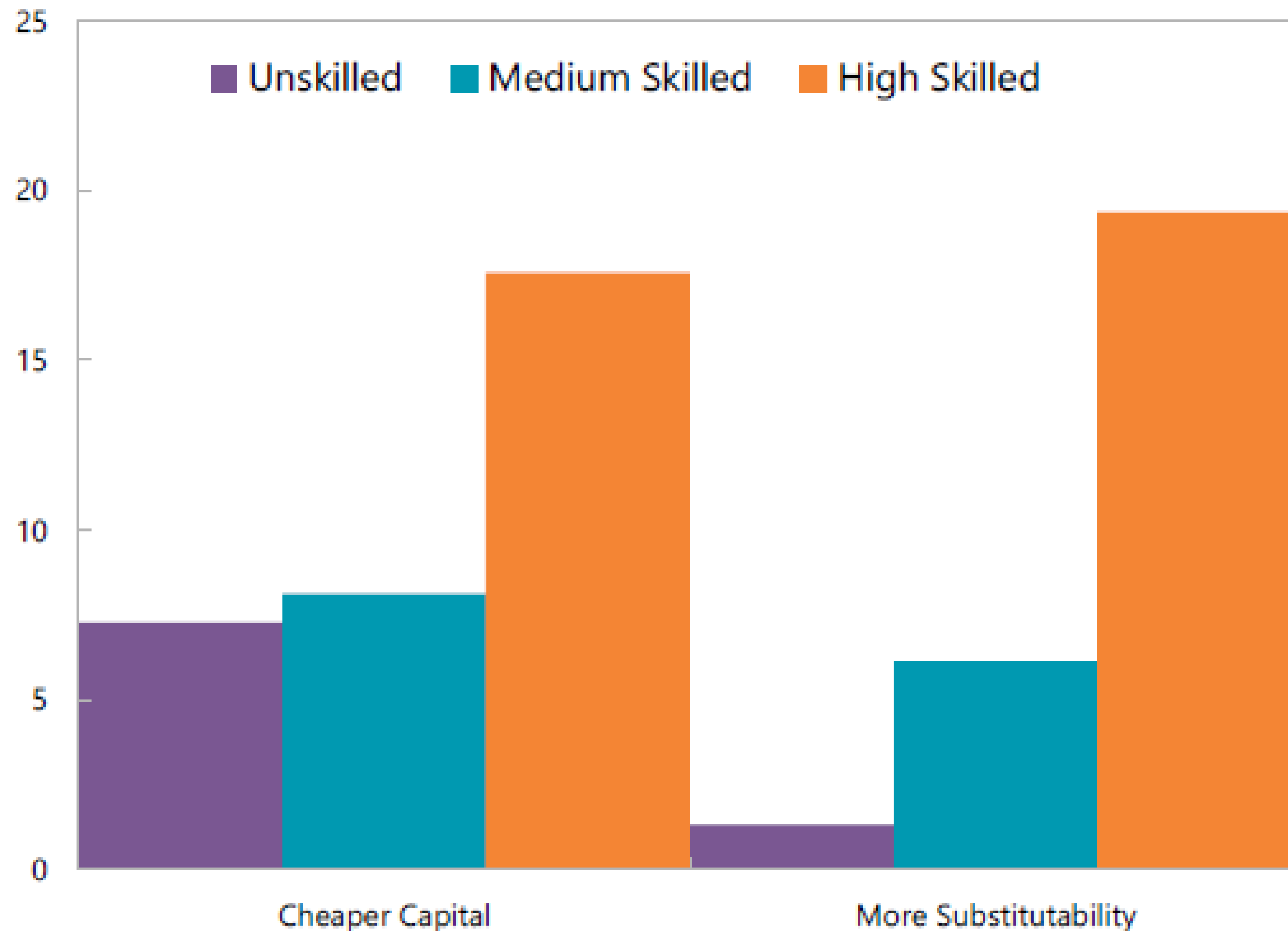# Exposure to routinization concomitant with higher K-L EOS
(elasticity of substitution vs. routine exposure by industry, 1992-2014)
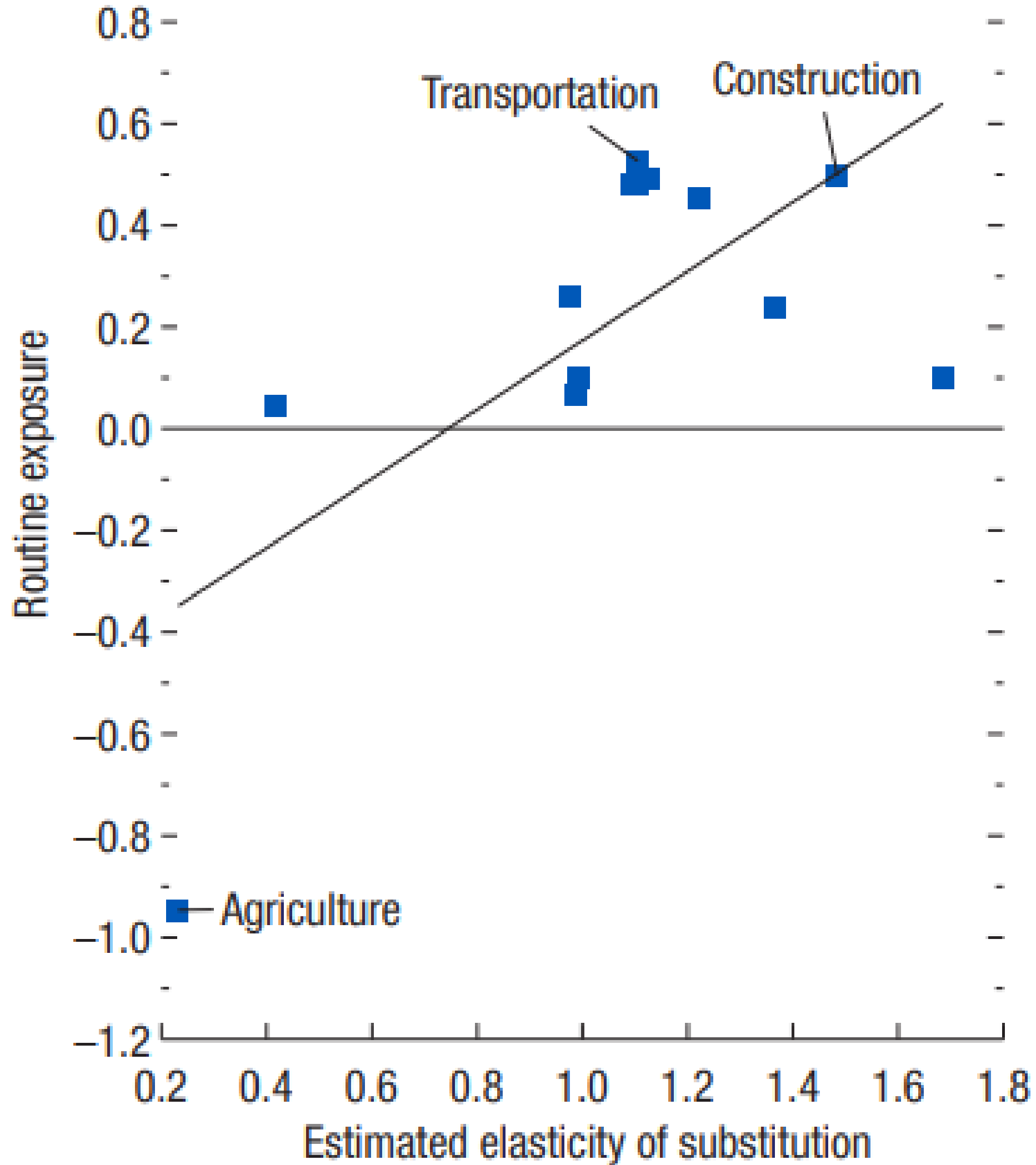
Higher EOS and cheaper price of capital both raise output, but also income inequality…

(CGE model simulations of 20% cheaper relative price of capital goods and 10% higher EOS, impact on steady-state income of each group in %)

Digitalization: *selected* macroeconomic features

- **Routinization**
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- **Falling relative price of capital goods**
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- **Asset intangibility**
  - o ~ 1/3 of US/EU Y/L growth over 2000-13 (Corrado et al., 2016)

- **Market power** (IMF, April 2019 WEO)
  - o Within-firm rise concentrated in small fraction of firms
  - o Between-firm reallocation toward high-markup firms (US, not EU)
  - o Patterns consistent with *some* role for common force like technology

Rising markups, concentrated in a small fraction of firms

(top decile versus other firms, based on cross-country firm-level estimates using Orbis)
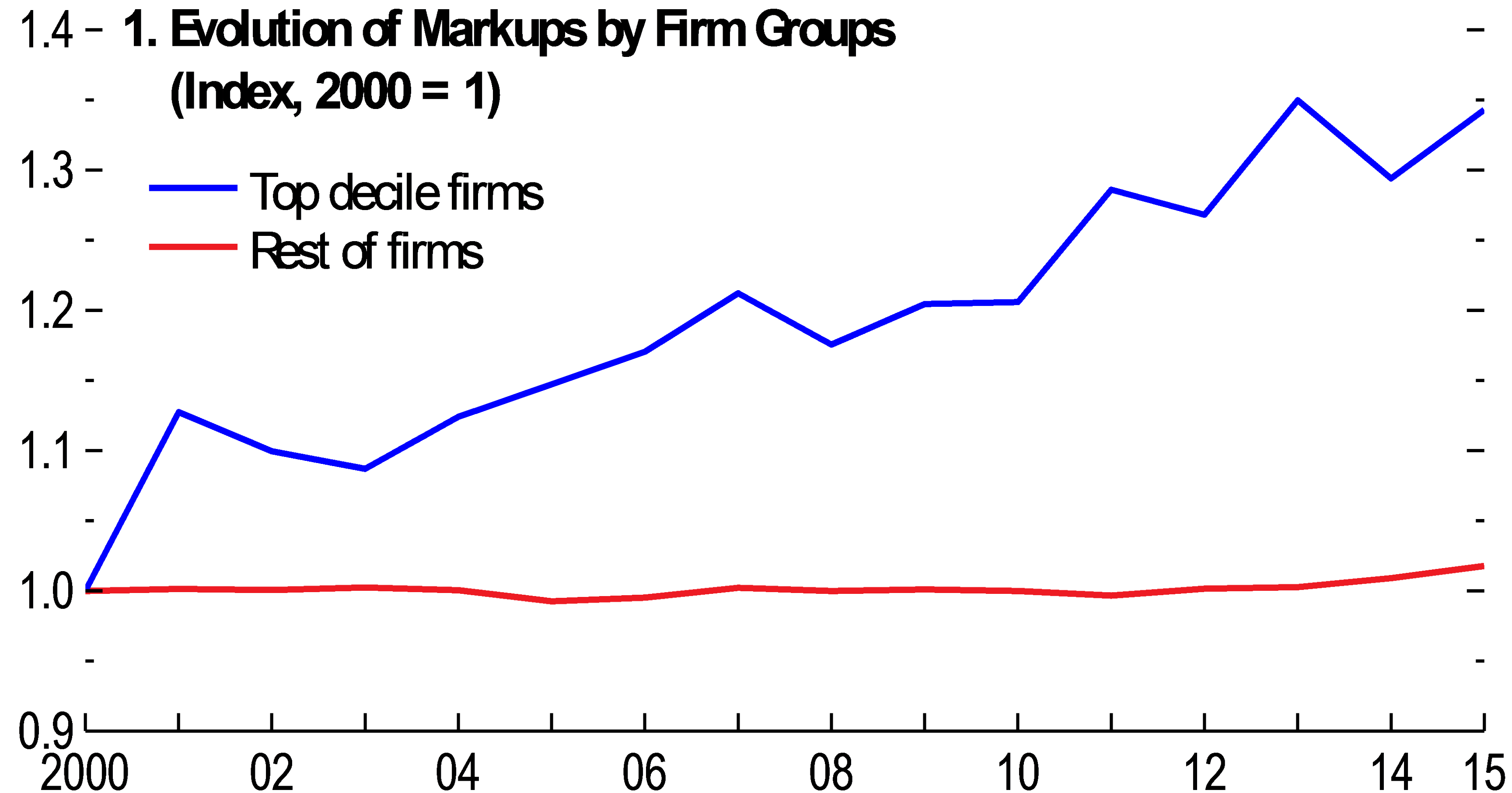
1. Evolution of Markups by Firm Groups

(Index, 2000 = 1)

— Top decile firms

— Rest of firms

Rising markups have reduced investment and the labor share…

(Average advanced economy since 2000, based on cross-country firm-level estimates using Orbis)

Investment rate

(implied change since 2000 in percentage points)
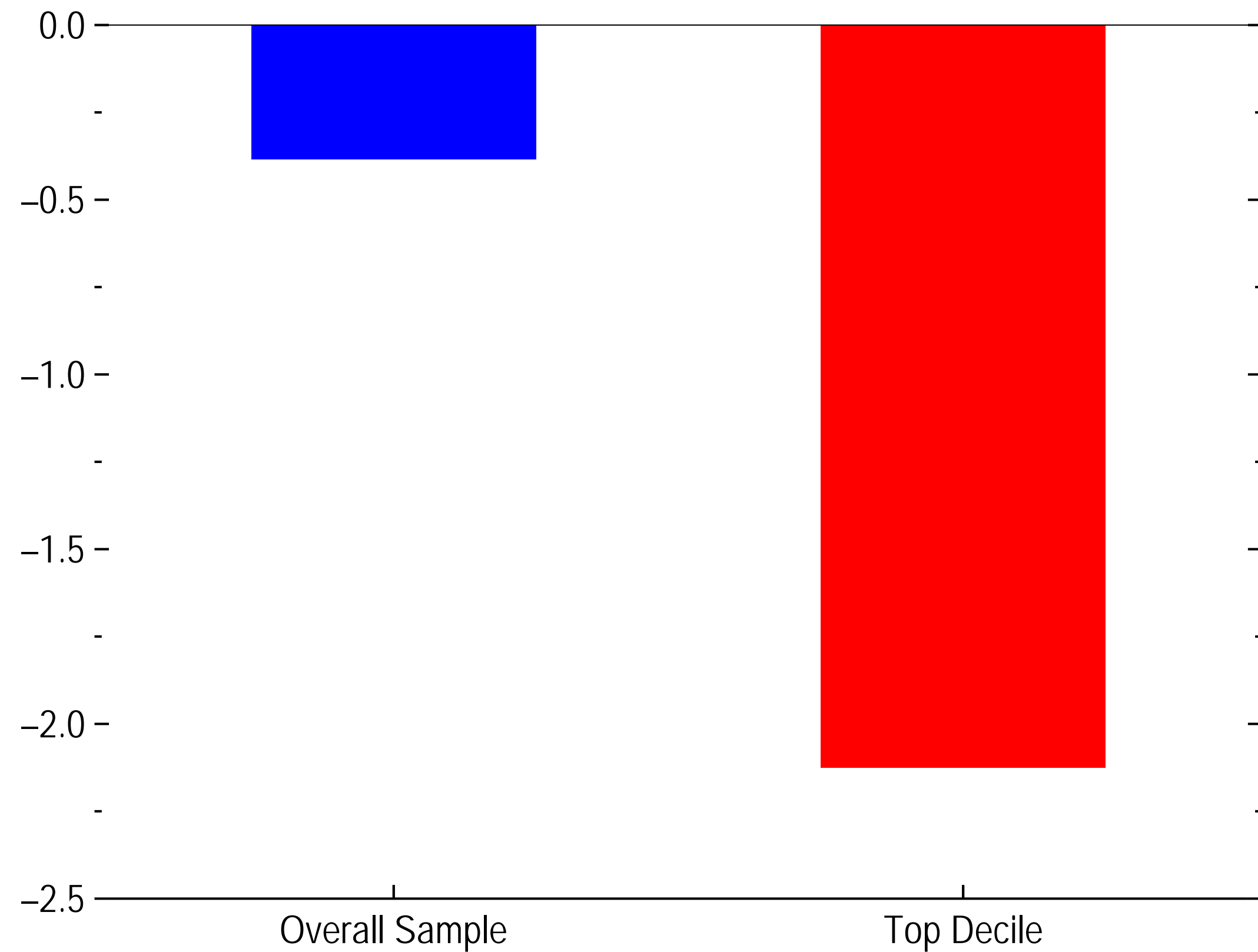
Labor share

(implied change since 2000 in percentage points)
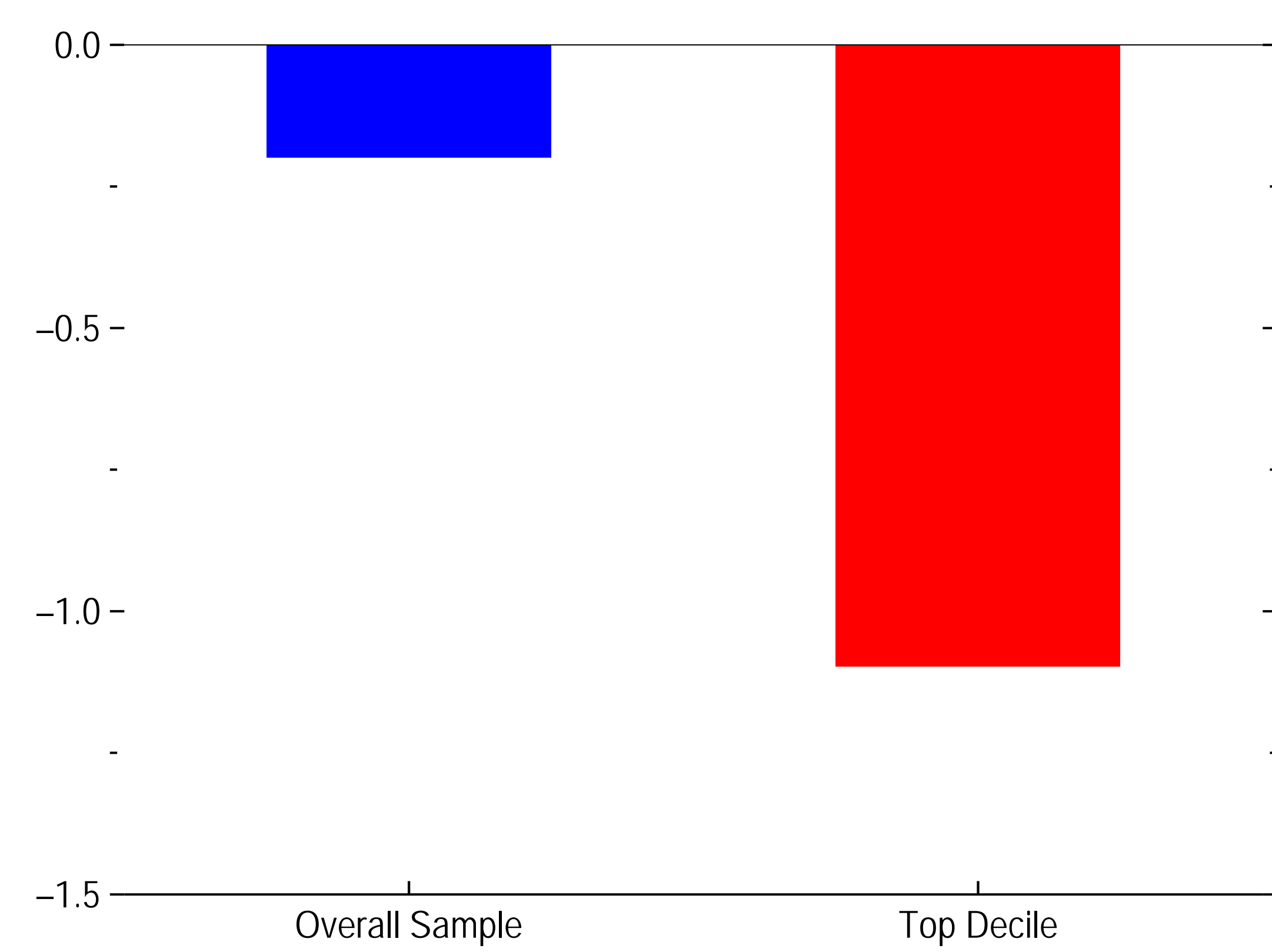
Sources: Orbis; and IMF staff calculations.
Note: Average changes in markups are weighted by operating revenue.

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...and could also weaken innovation going forward

(Estimated relationship between markups and patenting,
based on cross-country firm-level econometric estimates using Orbis)

Most high-markup firms (top decile) are already on the RHS
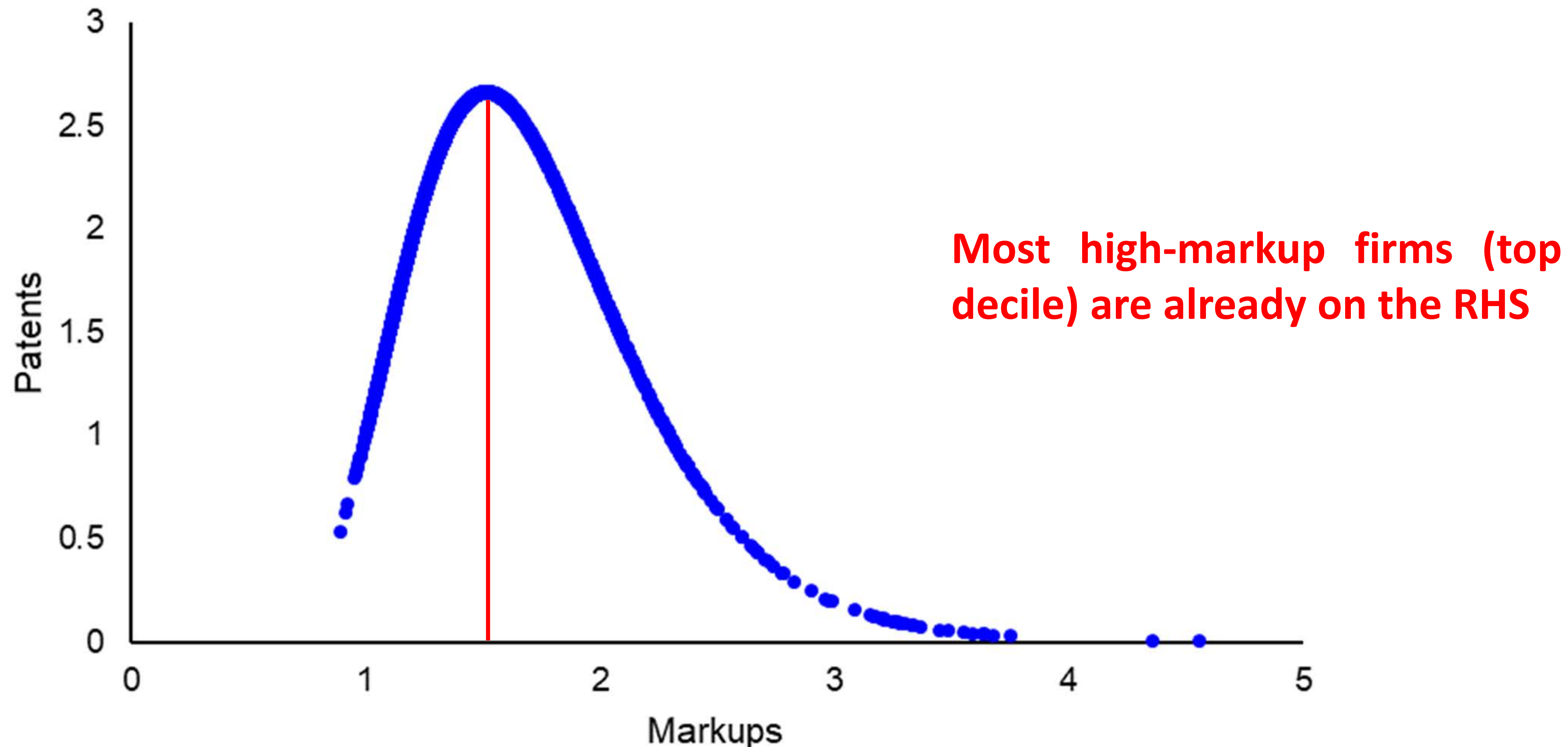
Source: Orbis; PATSTAT; and IMF staff calculations.
Note: The figure plots the effects of markups on the predicted average number of patents by country-sector. Predicted patents normalized to 1 for markups = 1.

Policy implications I — Reaping the gains

- **Adjust competition policy**
  - Market examinations and remedies
  - Greater emphasis on potential loss of competition
  - Competition authorities' resources
  - Regulatory vs. competition policies

- **Adjust diffusion policies**
  - IPRs—disruptive vs. incremental innovations

Policy implications II — Easing adjustment

- **Rethink labor market institutions**
  - Protect workers not jobs ➔ shift to UI away from EPL
  - Ease job transitions ➔ increased spending on ALMPs—but need to address return heterogeneity, scalability and displacement

- **Rethink social insurance**
  - Ease not just job but also status transitions
  - ➔ Portable social rights (domestic and cross-border in EU)
  - ➔ Promising example: individual accounts (e.g. Austria, Sweden)

Policy implications III — Sharing the gains

- **Redistribute gains through tax-benefit system**
  - Growing pressure: market income inequality; education, UI, ALMPs…etc
  - Can spread out digitalization gains at fairly low efficiency cost, *if* well-designed

- **Reform corporate taxation**
  - Rising market power strengthens case for shift away from profit to super-profit taxation (e.g. cash flow tax)…
  - …and asset intangibility strengthens case for destination-based over source-based taxation

Well-designed redistribution through tax system can spread the income gains from technological advances more widely

(CGE model simulations of 20% cheaper relative price of capital goods, with and without a personal income tax cut targeted at middle incomes financed by VAT)

Legend:
- High skilled
- Medium skilled
- Unskilled
- Unchanged Policy

X-axis: Cheaper Capital | More Substitutability
Financed by Higher VAT
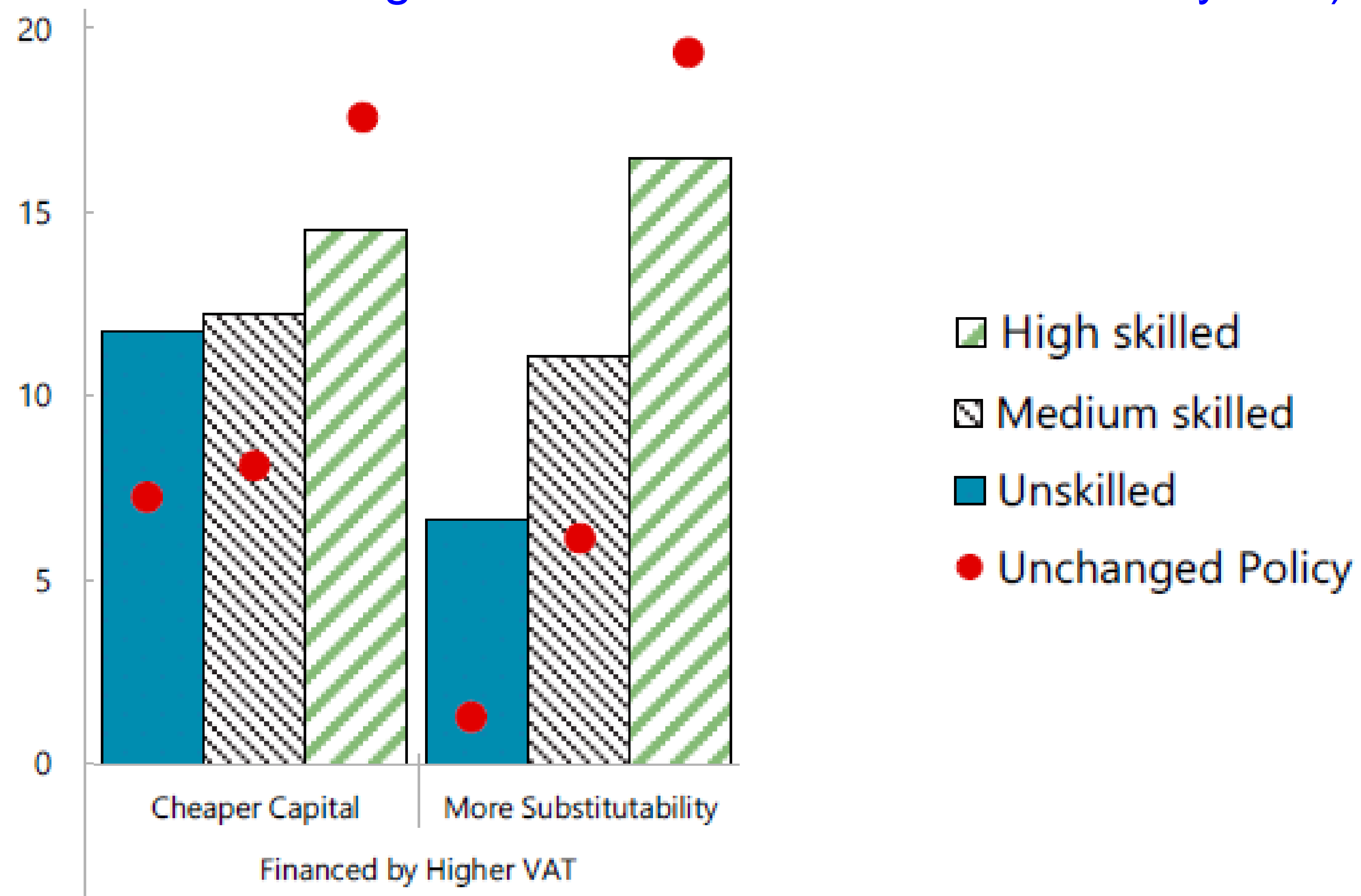
Policy implications IV — Monetary policy

- **Phillips curve**
  - Limited impact from rising market power (sign, magnitude)
  - Limited impact from changing price stickiness so far?

- **Natural rate**
  - Small decline (~0.1 pct pt) from trend rise in market power since 2000. Future?
  - Made macro stabilization marginally more difficult after GFC

- **Effective lower bound (for *given* natural rate)**
  - Could CB digital currencies also make it less binding in the (distant) future under certain conditions? (IMF SDN 18/08)

- **Asset tangibility**
  - Strengthens need for, and impact of macro stabilization policy (Duval et al. 2019a,b)

Implied Impact of Higher Markups on Phillips Curve in the US

(Simulated impact of estimated shocks to US economy on employment and inflation under high (2015) and low (2000) markups: Calvo versus Rotemberg pricing)
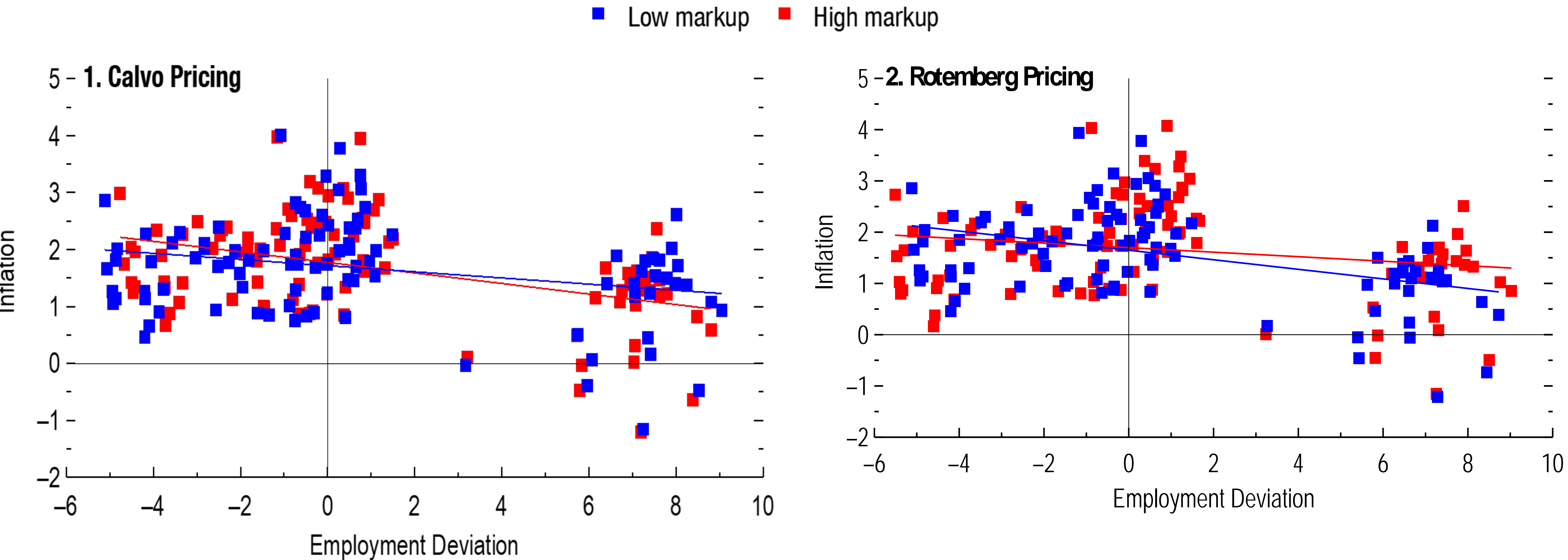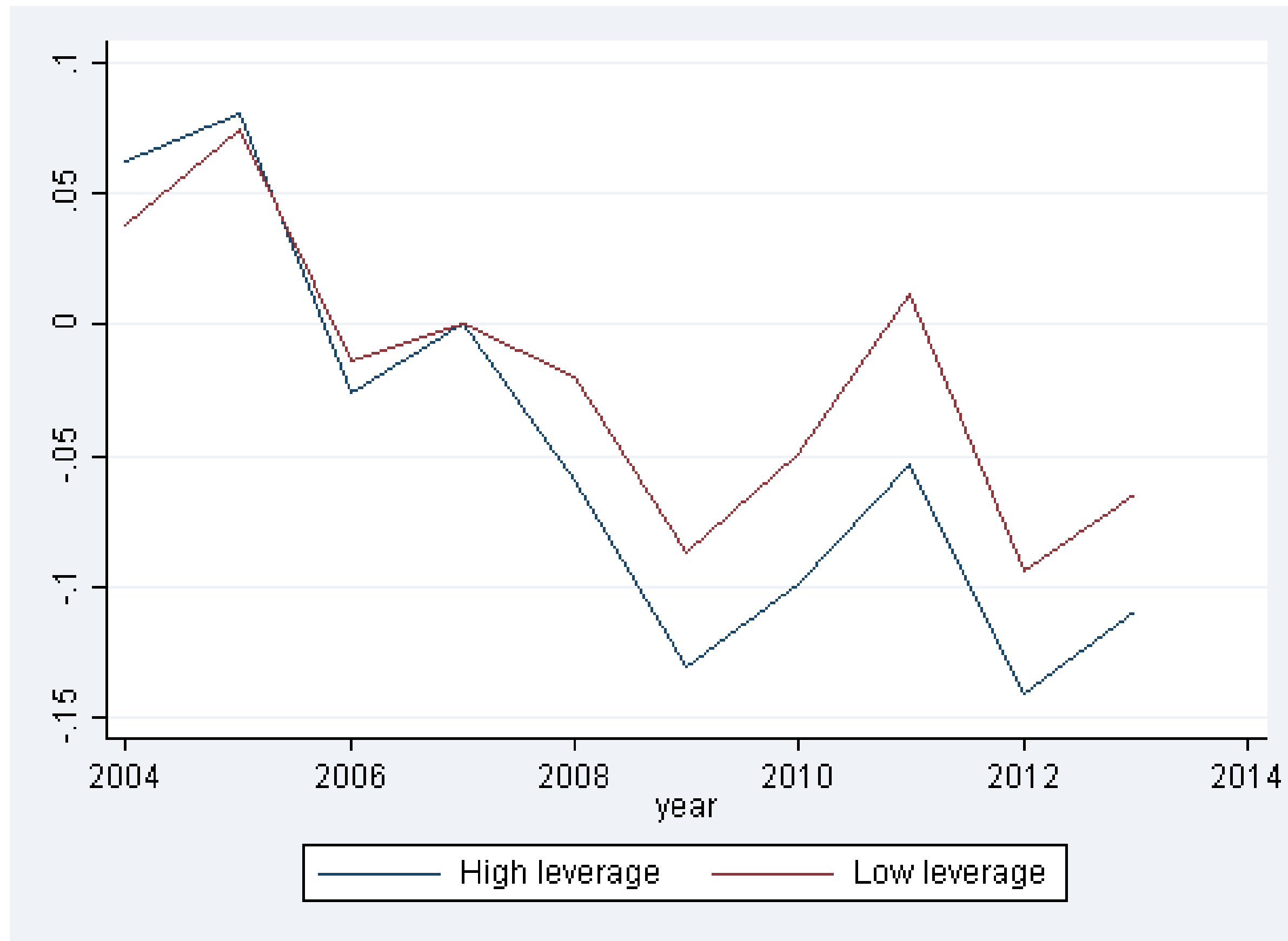

Source: IMF staff calculations.

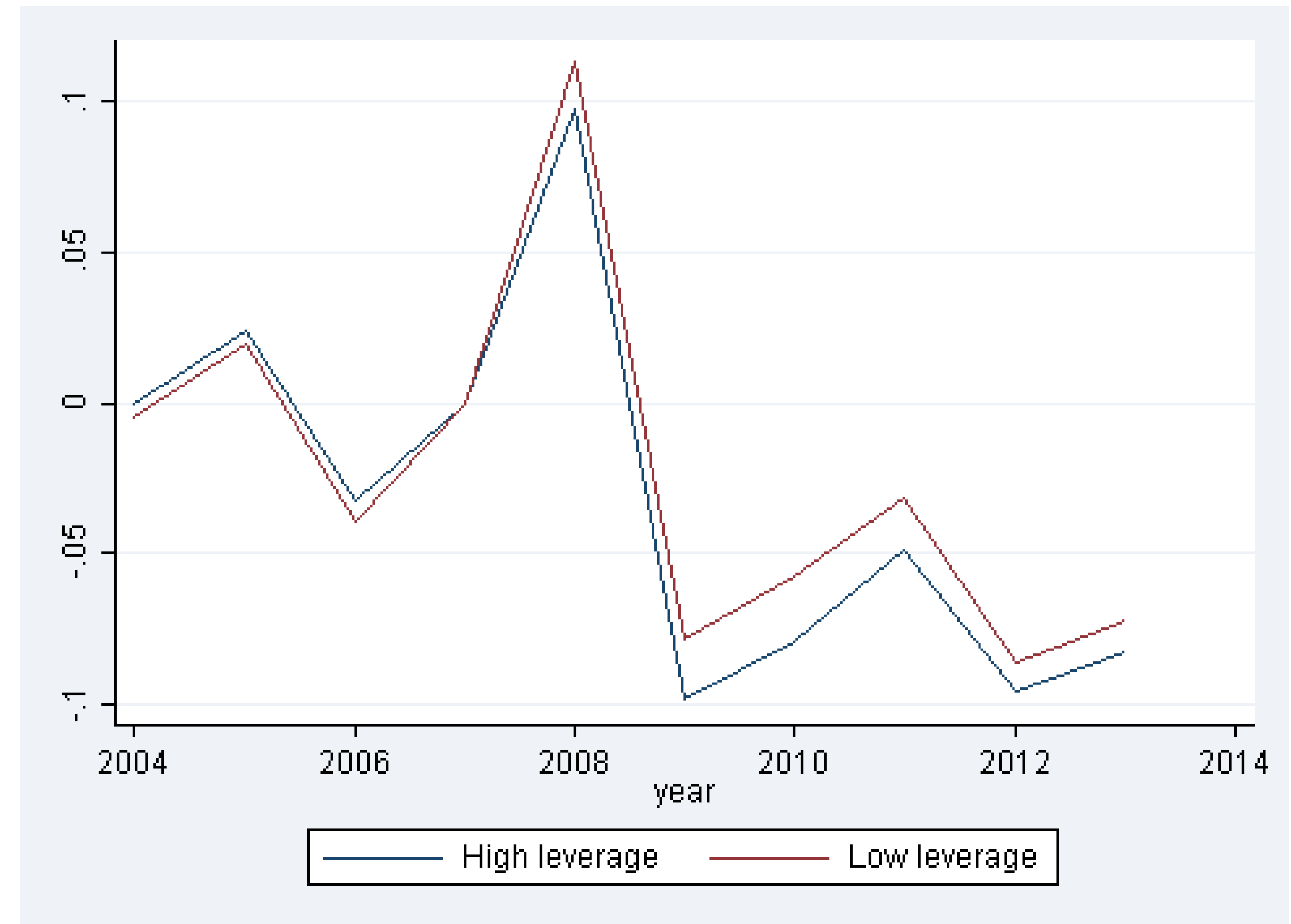# More leveraged firms cut intangible investment more after GFC

Intangible investment
(firms with high vs low leverage before the GFC)
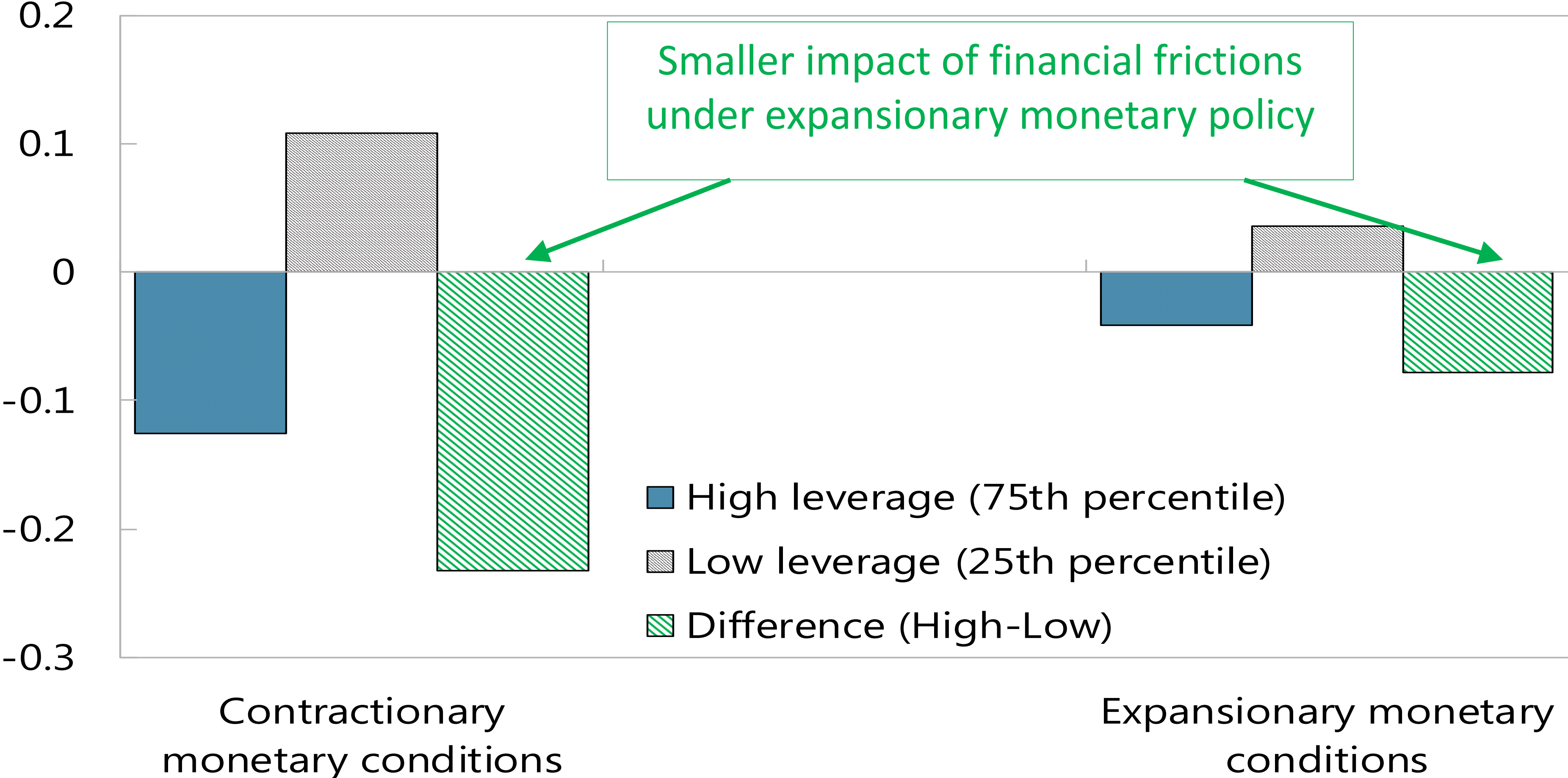
Tangible investment
(firms with high vs low leverage before the GFC)

Note: average annual growth in intangible investment, expressed as a deviation from its country-sector average over 2000-2015. Source: Ahn, Duval and Sever (forthcoming).

Monetary policy as a powerful intangible investment stabilizer

Estimated Decline in Intangible Assets Investment
(in percent of total assets)

Smaller impact of financial frictions under expansionary monetary policy

- ■ High leverage (75th percentile)
- ▨ Low leverage (25th percentile)
- ▨ Difference (High-Low)

Contractionary monetary conditions

Expansionary monetary conditions

Note: High (low) leverage corresponds to the 75th (25th) percentile of the cross-firm distribution of pre-crisis average leverage ratio. The green shaded bars indicate the difference in estimated effects for high and low leverage firms, separately for contractionary and expansionary monetary conditions. Estimated coefficients are from column (2) in the baseline results table. Expansionary/contractionary monetary conditions are defined as forecast errors in 10-year gov't bond yields by ±50

Thank you!