# FISCAL STABILIZATION AND PRODUCTIVE INVESTMENT: EVIDENCE FROM ADVANCED ECONOMIES*

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*The views expressed here are those of the author and do not necessarily represent the views of the IMF, its executive board, or IMF management.
Presentation based on joint work with Sam Choi (IMF) and Joao Jalles (IMF)

# Motivation

- Several years after the GFC growth in many countries remains well below pre-crisis rates.
- Medium-term growth prospects have declined since the Great Recessions.
- Public debt-to-GDP ratios have increased in many AEs, reaching historical high levels in some of them.

***How can fiscal policy contribute to higher medium-term growth?***

# Theoretical Channel

- Fiscal policy has a stabilizing effect on the economy if the budget balance-to-GDP ratio increases when output growth increases and falls when output growth declines:
  - the more countercyclical government spending is, the higher the effect of FS;
  - the more progressive taxes are, the higher FS will be.

- Fiscal policy can affect productivity growth by reducing volatility and incentives to cut productive-enhancing investment versus short-term projects (Aghion et al. 2010):
  - Short-term projects face aggregate productivity shocks, long-term projects subject to liquidity risks: with credit market imperfections, reducing the volatility of aggregate shocks increases the likelihood that long-term project survives;
  - The effect of fiscal stabilization is larger for firms that are credit constrained and in periods when credit constraints are binding (recessions).

# Contribution

Building on Aghion et al. (2014) but extending to:

- Estimate time-varying measures of fiscal stabilization.

- Directly test the effect of FS on productivity-enhancing investment (R&D and ICT).

- Examine the role of business cycle.

# Link to existing literature

- Volatility and Growth (e.g., Ramey and Ramey 1995): volatility affects growth mostly trough TFP.

- Role of financial frictions in amplifying the effect of volatility on growth (e.g. Gilchrist et al. 2014).

- Fiscal policy and medium-term growth.

# Empirical Methodology

Empirical framework

- Diff-in-Diff approach:

$$G_{i,j,t} = \alpha_{i,t} + \gamma_{i,j} + \vartheta_{j,t} + \beta f d_j FS_{i,t} + \varepsilon_{i,j,t}$$

- *G*=R&D expenditure, ICT capital
- fd= dependence on external finance (RZ index)
- i country; j sector; t time
- Pros vs cons: addressing endogeneity vs inferring general equilibrium effects

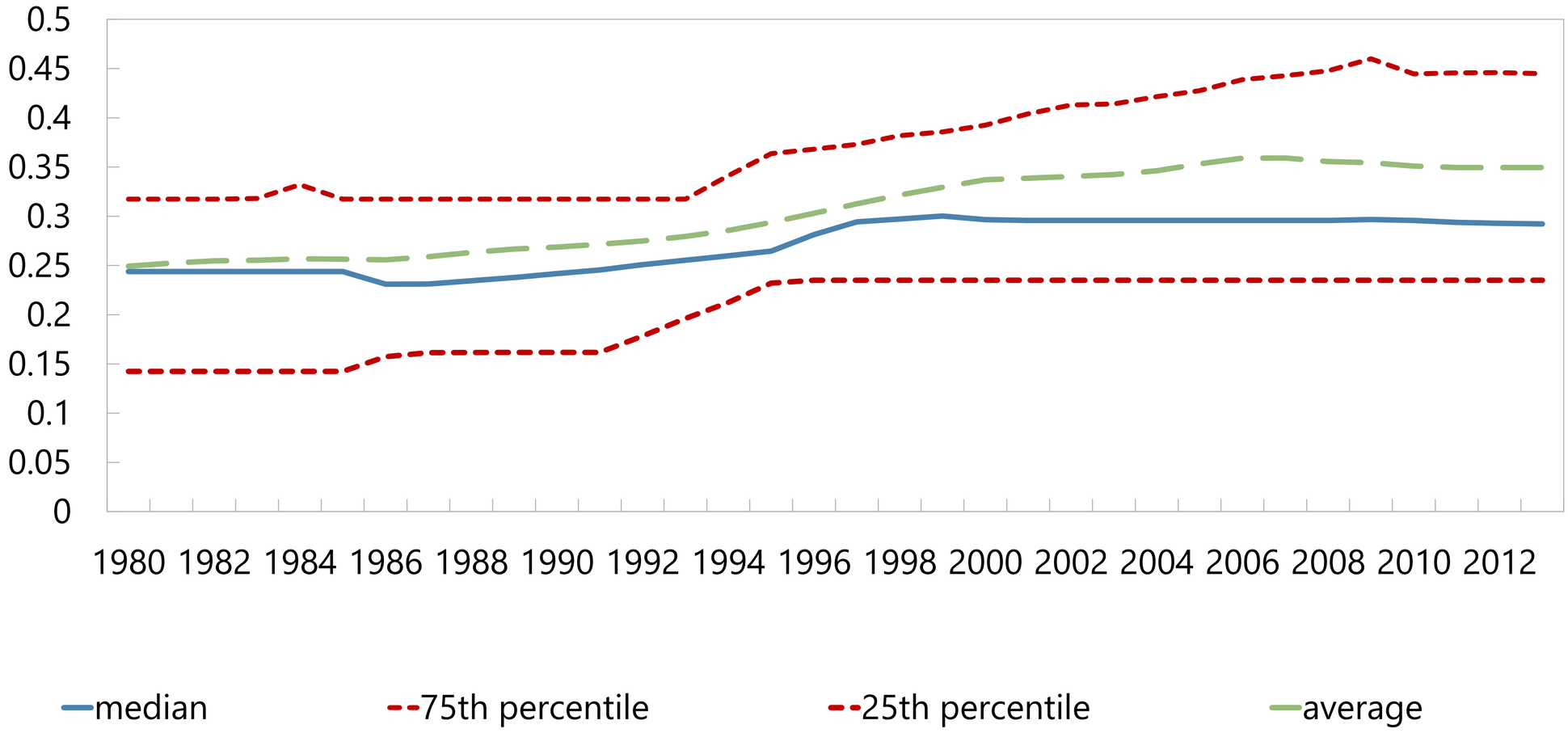
# Measuring FS

Data

- Measuring fiscal stabilization (FS)—static framework: $b_i = \alpha_i + FS_i \Delta y_i + \varepsilon_i$
- Allowing for time-varying fiscal stabilization: $b_{it} = \alpha_{it} + FS_{it} \Delta y_{it} + \varepsilon_{it}$
- where: $FS_{it} = FS_{it-1} + v_{it}$
- Estimated using MME
- Advantages: (i) it allows using all observations in the sample to estimate the degree of fiscal stabilization in each; (ii) changes in the degree of fiscal stabilization in a given year come from innovations in the same year; (iii) it reflects the fact that changes in policy are slows and depends on the immediate past; (iv) it reduces reverse causality.

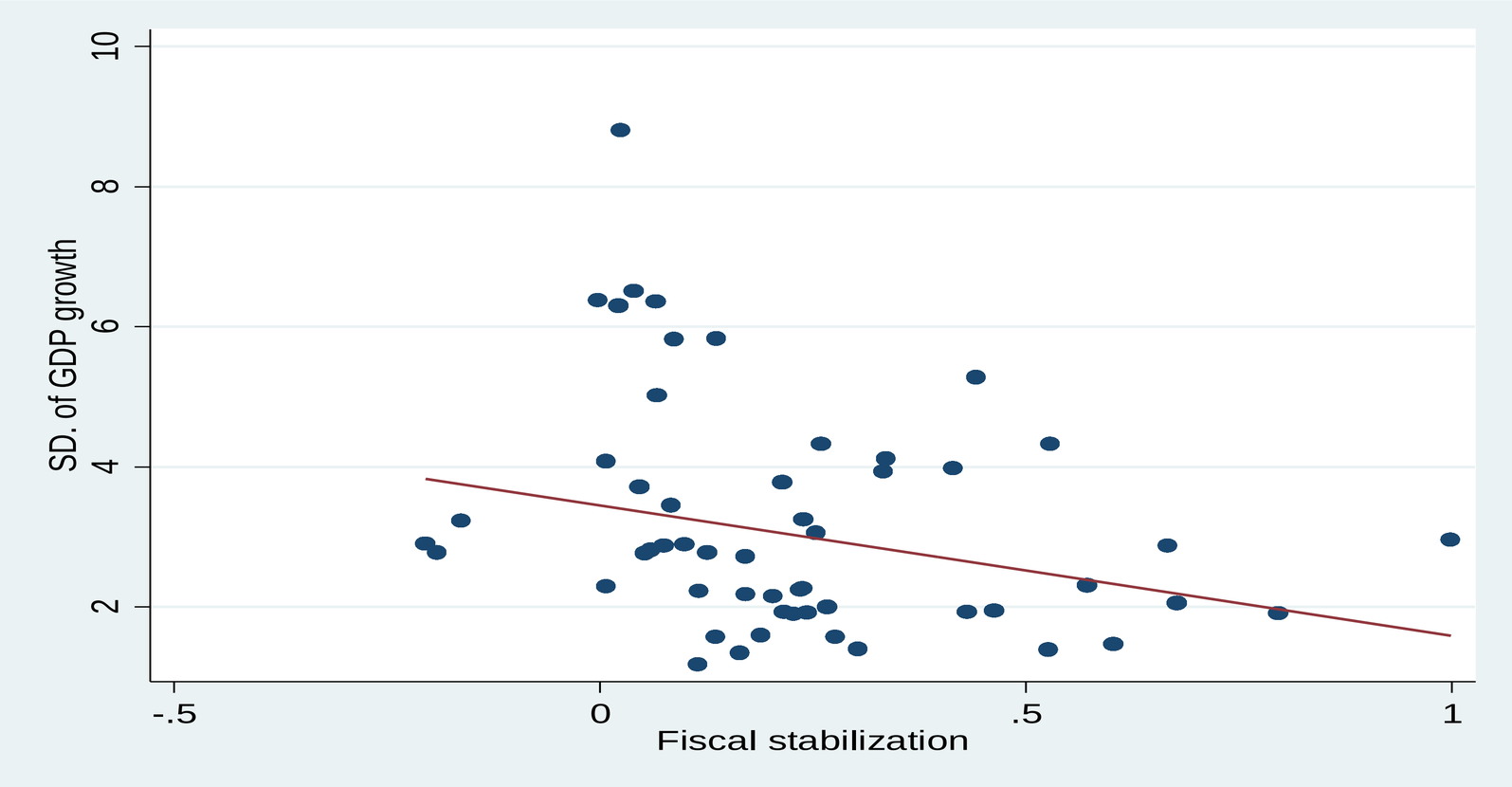
# FS over time

Data



# FS and volatility—cross-country

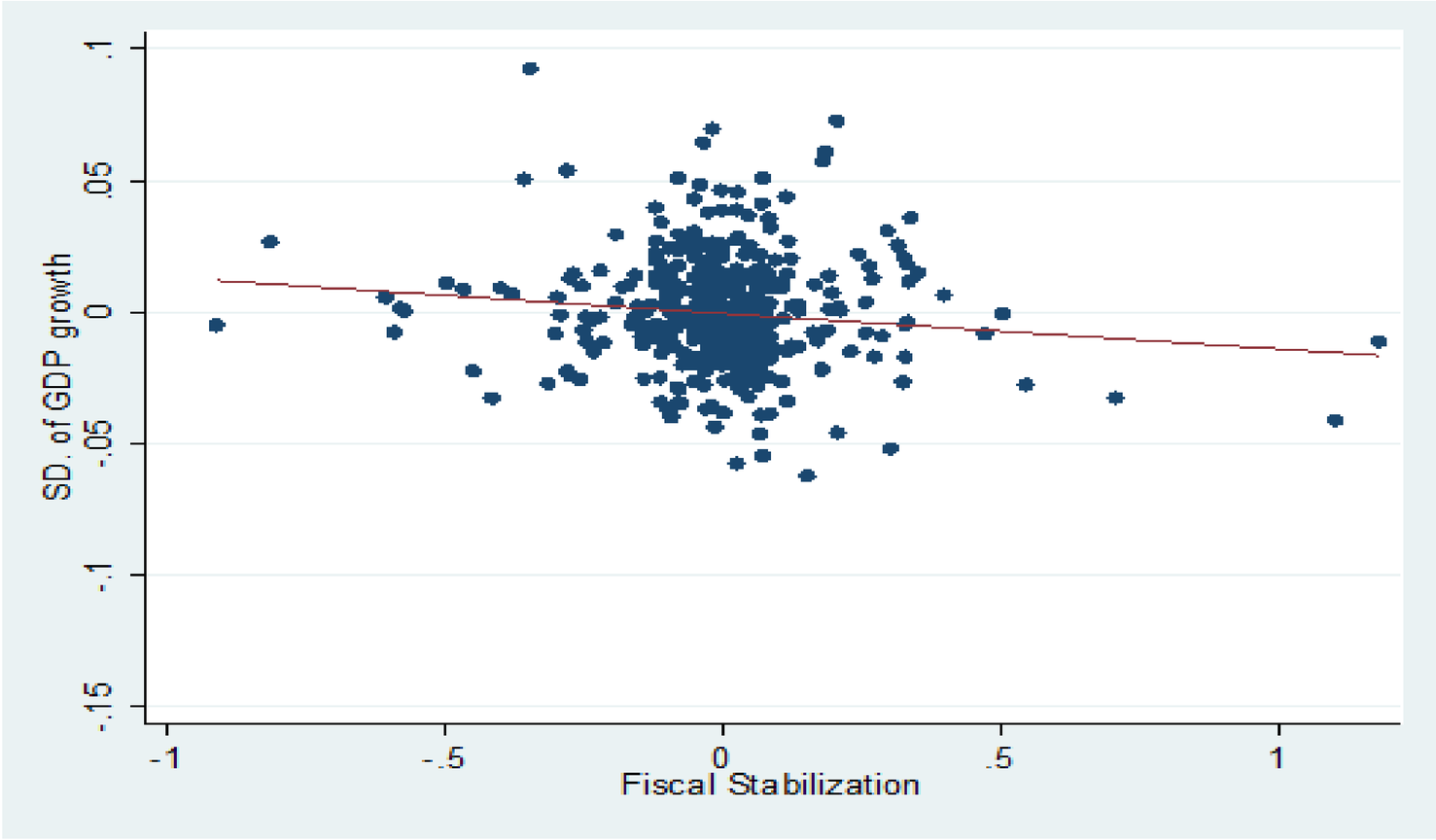
Data




Note: Figure displays the correlation between the average of our fiscal stabilization measure and the standard deviation of real GDP growth.

# FS and volatility—over time

Data




Note: Figure displays the correlation between the 5-year non-overlapping average of our fiscal stabilization measure and the 5-year non-overlapping standard deviation of real GDP growth. Both measures are purged by country- and time-fixed effects.

# Sectoral data

- ICT: EU-World Klems
- R&D: OECD Research and Development Industry database
- External finance (fd): Compustat (based on Rajan and Zinglaes 1998)
- Sample: unbalanced sample of 25 industries for 18 AEs over 1985-2012.

# Baseline

Results

| Explanatory variable | (I) | (II) | (III) |
|---|---|---|---|
| | Growth | R&D | ICT-capital share |
| Fiscal stabilization* financial dependence | 4.364** | 0.914*** | 0.162*** |
| | (1.93) | (2.90) | (3.72) |
| Differential effect (%) | 0.5 | 10.1 | 1.8 |
| Country*time fe | yes | yes | yes |
| Country*sector fe | yes | yes | yes |
| Observations | 12,734 | 4,759 | 9,944 |
| $R^2$ | 0.35 | 0.97 | 0.77 |

Note: estimates based on equation (5). T-statistics based on clustered standard errors at the country-industry level are reported in parenthesis. *, **, *** denote significance at 10, 5 and 1 percent, respectively. Differential effects computed for an industry whose external financial dependence would increase from the 25th percentile to the 75th percentile of the financial dependence distribution when fiscal stabilization would increase from the 25th to the 75th percentile.

# Different sample of industries

Results

| Explanatory variable | (I) | (II) | (III) | (IV) |
|---|---|---|---|---|
| | All sectors | | Manufacturing | |
| | R&D | ICT-capital share | R&D | ICT-capital share |
| Fiscal stabilization* financial dependence | 0.914*** (2.90) | 0.162*** (3.72) | 1.206*** (4.02) | 0.173*** (3.72) |
| Differential effect (%) | 10.1 | 1.8 | 13.3 | 1.9 |
| Observations | 4,759 | 9,944 | 3,952 | 6,165 |
| $R^2$ | 0.97 | 0.77 | 0.98 | 0.81 |

Note: estimates based on equation (5). Country*time and country*sector fixed effects included. T-statistics based on clustered standard errors at the country-industry level are reported in parenthesis. *, **, *** denote significance at 10, 5 and 1 percent, respectively. Differential effect computed for an industry whose external financial dependence would increase from the 25th percentile to the 75th percentile of the financial dependence distribution when fiscal stabilization would increase from the 25th to the 75th percentile.

# Uncertainty in FS—WLS

Results

| Explanatory variable | (I) | (II) |
|---|---|---|
| | R&D | ICT-capital share |
| Fiscal stabilization*financial dependence | 1.224*** | 0.138*** |
| | (2.78) | (2.57) |
| Differential effect (%) | 13.5 | 1.5 |
| Observations | 4,759 | 9,944 |
| $R^2$ | 0.97 | 0.77 |

Note: estimates based on equation (5). Country*time and country*sector fixed effects included. T-statistics based on clustered standard errors at the country-industry level are reported in parenthesis. *, **, *** denote significance at 10, 5 and 1 percent, respectively. Differential effect computed for an industry financial dependence would increase from the 25th percentile to the 75th percentile of the financial dependence distribution when fiscal stabilization would increase from the 25th to the 75th percentile.

# Alternative FS

Results

| Explanatory variable | (I) | (II) | (I) | (II) |
|---|---|---|---|---|
| | R&D | ICT-capital share | R&D | ICT-capital share |
| Fiscal stabilization (primary balance)* financial dependence | 0.479*** (3.05) | 0.029** (2.02) | | |
| Fiscal stabilization (IV)* financial dependence | | | 1.118*** (4.20) | 0.037*** (2.58) |
| Differential effect (%) | 5.5 | 0.3 | 15.3 | 0.5 |
| Observations | 2,960 | 6,727 | 3,480 | 5,230 |
| $R^2$ | 0.97 | 0.81 | 0.97 | 0.78 |

Note: estimates based on equation (5). Country*time and country*sector fixed effects included. T-statistics based on clustered standard errors at the country-industry level are reported in parenthesis. *, **, *** denote significance at 10, 5 and 1 percent, respectively. Differential effect computed for an industry asset tangibility would increase from the 25th percentile to the 75th percentile of the financial dependence distribution when fiscal stabilization would increase from the 25th to the 75th percentile.

# Controlling for other factors—R&D

Results

| Explanatory variable | (I) | (II) | (III) | (IV) |
|---|---|---|---|---|
| Fiscal stabilization* financial dependence | 0.627* (1.94) | 0.810** (2.49) | 2.254*** (5.94) | 1.912*** (4.60) |
| Credit to GDP * financial dependence | 0.004*** (4.07) | | | 0.003*** (2.87) |
| Inflation* financial dependence | | -0.012 (-1.36) | | -0.006 (-0.48) |
| Uncertainty * financial dependence | | | 0.102* (1.85) | 0.097 (1.63) |
| Differential effect (%) | 6.9 | 9.0 | 24.9 | 21.2 |
| Observations | 4,690 | 4,759 | 3,676 | 3,617 |
| $R^2$ | 0.97 | 0.97 | 0.97 | 0.97 |

Note: estimates based on equation (5). Country*time and country*sector fixed effects included. T-statistics based on clustered standard errors at the country-industry level are reported in parenthesis. *, **, *** denote significance at 10, 5 and 1 percent, respectively. Differential effect computed for an industry whose external financial dependence would increase from the 25th percentile to the 75th percentile of the financial dependence distribution when fiscal stabilization would increase from the 25th to the 75th percentile.

# Controlling for other factors—ICT

Results

| Explanatory variable | (I) | (II) | (III) | (IV) |
|---|---|---|---|---|
| Fiscal stabilization* financial dependence | 0.232*** (4.59) | 0.181*** (4.10) | 0.242*** (5.03) | 0.365*** (6.55) |
| Credit to GDP * financial dependence | -0.001*** (-2.72) | | | -0.001*** (3.82) |
| Inflation* financial dependence | | 0.001 (1.18) | | 0.001 (0.50) |
| Uncertainty * financial dependence | | | -0.013*** (-2.70) | -0.012*** (-2.63) |
| Differential effect (%) | 2.6 | 2.0 | 2.7 | 4.0 |
| Observations | 9,841 | 9,728 | 8,835 | 8,516 |
| $R^2$ | 0.78 | 0.79 | 0.77 | 0.80 |

Note: estimates based on equation (5). Country*time and country*sector fixed effects included. T-statistics based on clustered standard errors at the country-industry level are reported in parenthesis. *, **, *** denote significance at 10, 5 and 1 percent, respectively. Differential effect computed for an industry whose external financial dependence would increase from the 25th percentile to the 75th percentile of the financial dependence distribution when fiscal stabilization would increase from the 25th to the 75th percentile.

# Recessions vs. expansions

Results

| Explanatory variable | (I) R&D expenditure | (II) Share of ICT-capital |
|---|---|---|
| Fiscal stabilization* financial dependence *recessions | 1.221*** (3.02) | 0.243*** (4.80) |
| Fiscal stabilization * financial dependence*expansions | -0.006 (-0.01) | 0.131** (2.30) |
| Expansion* financial dependence | 0.552*** (2.78) | -0.014 (-0.84) |
| Observations | 4,745 | 9,867 |
| $R^2$ | 0.77 | 0.78 |

Note: estimates based on equation (9). Country*time and country*sector fixed effects included. T-statistics based on clustered standard errors at the country-industry level are reported in parenthesis. *, **, *** denote significance at 10, 5 and 1 percent, respectively.

# Conclusions and extensions

Conclusions:

• FS can boost medium-term growth: fiscal counter-cyclicality increases industry R&D (ICT capital), particularly those that are credit constrained and during recessions.

Extensions:

• Drivers of FS: gov. size but also financial depth and better institutions (Furceri and Jalles 2017).

• Extend analysis to EMDEs and test role of other channels (Choi, Furceri and Jalles, 2017).

# Other channels through which FS can affect growth

- Capital depreciation (+)
- Investment-specific technological change (+)
- R&D intensity (+)
- Asset fixity (-)
- Labor intensity (+/-)
- Investment lumpiness (+)

# Other channels through which FS can affect growth

| Theories | | Findings | | |
|---|---|---|---|---|
| Channel | | Full sample | Advanced economies | Developing economies |
| EFD | + | + | ++ | + |
| DEP | + | ++ | + | + |
| ISTC | + | + | – | + |
| RND | + | + | + | – |
| FIX | – | – – | – – | – – |
| LAB | + (– possible) | ++ | ++ | ++ |
| LMP | + | ++ | ++ | + |

Note: + (–) in theory column indicates positive (negative) interaction effects from existing theories. + + (– –) sign in findings column indicates statistically significant positive (negative) interaction effects, whereas + (–) sign indicates positive (negative), but insignificant interaction effects. EFD= external finance dependence; DEP= capital depreciation; ISTC=investment specific technological change; RND=R&D intensity; FIX= asset fixity; LAB= labor intensity; LMP=investment lumpiness.

# *THANK YOU*

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