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# The Sectoral Effects of Sudden Stops
# An Empirical Investigation

István Kónya [a, b] – Miklós Váry [b]
[a] CERS IE, [b] UP FBE

# Motivation

- The global financial crisis and the current COVID crisis highlighted the importance of flexible responses to large economic shocks
- Typically, the adjustment process is facilitated by sectoral reallocation
- There is significant heterogeneity among countries in how they react to such shocks, but also in their industrial composition
- Our question: are these two related?
- In particular, we look at the impact of large open economy shocks – sudden stops – on the performance of the main production sectors of economies

# What we do

- We identify sudden stop episodes across many countries and time periods
- We look for patterns at the sectoral level using an event-study methodology and panel regressions
  - We compare sectoral value-added levels and growth before and after a sudden stop episode starts
- Our results indicate that
  - Construction is the sector most affected by sudden stops, both before and after
  - Industry and manufacturing are important drivers of the recovery process
  - There is a prolonged reallocation away from service sectors and towards the production of goods

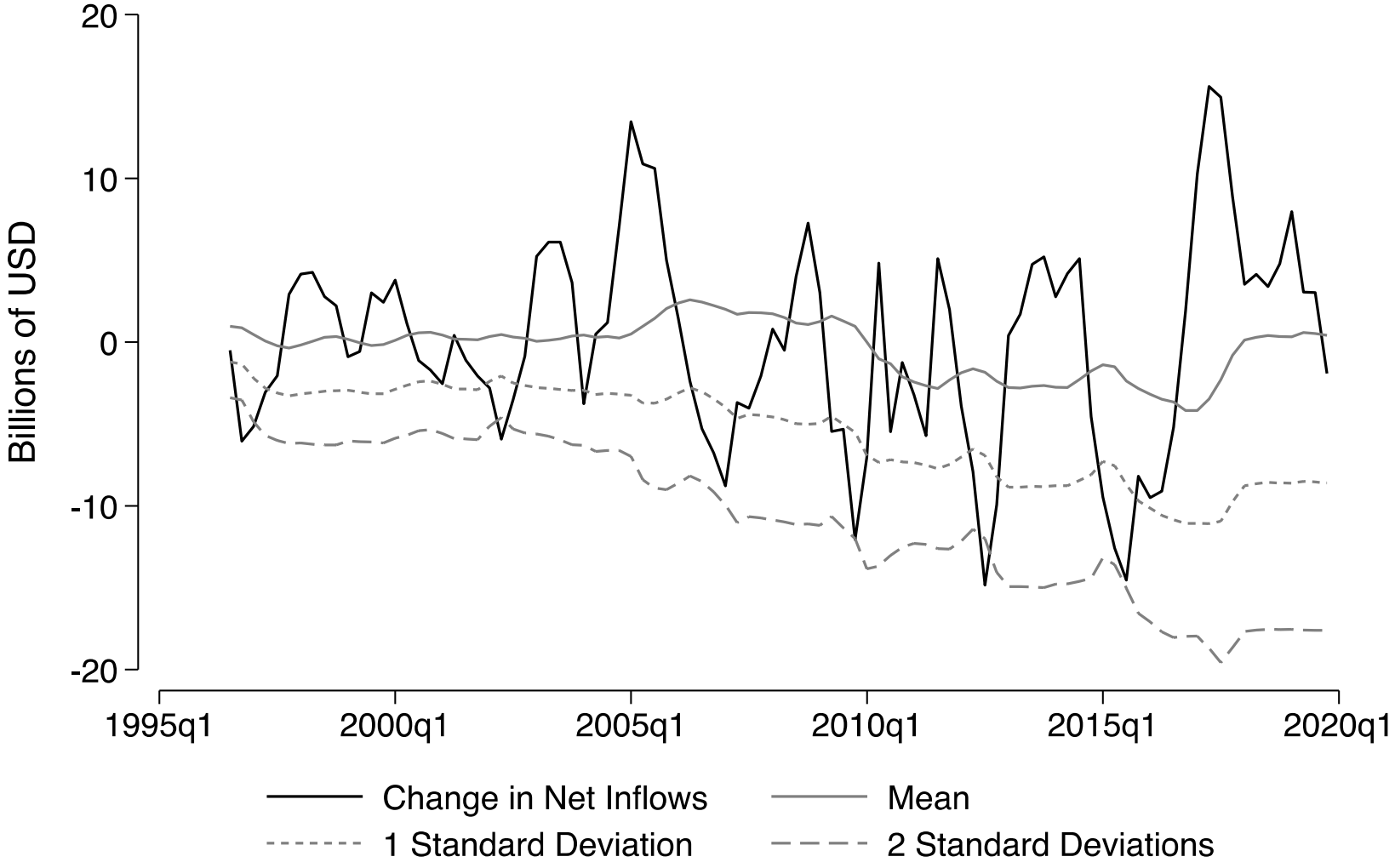
# Literature

- Financial liberalization and the trade-off between efficiency and resilience (Tornell et al., 2003; Rancière et al., 2008)
- Predicting the probability of a sudden stop (Calvo et al., 2004; Cavallo – Frankel, 2008; Forbes – Warnock, 2012; Benigno et al., 2015; Kalantzis, 2015)
- The effects of sudden stops
  - Significant decline in real GDP growth (Calvo – Reinhart, 2000; Calvo et al., 2006; Edwards, 2007; Eichengreen – Gupta, 2018)
  - Significant depreciation of the domestic currency (Cavallo et al., 2015; Eichengreen – Gupta, 2018)
  - The role of DLD, openness to trade and the exchange rate regime (Guidotti et al., 2004), difference between gross and net inflows (Rothenberg – Warnock, 2011; Cavallo et al., 2015)
- The sectoral effects of sudden stops
  - Craighead – Hineline (2015): current account reversals, smaller sample, growth effects only
  - Cowan – Raddatz (2013): manufacturing sectors only

# The sudden stop algorithm

- We define a sudden stop as a large and unexpected fall in net capital inflows (Calvo et al., 2004)
- We use quarterly IMF data on the financial account (analytical presentation)
- Large drops in the financial account are defined relative to a rolling average over the previous five years
- A sudden stop occurs when the change in net FA drops at least by two standard deviations
- We find 331 sudden stop episodes overall, but sectoral data is much more limited

# Detecting sudden stops – Hungary



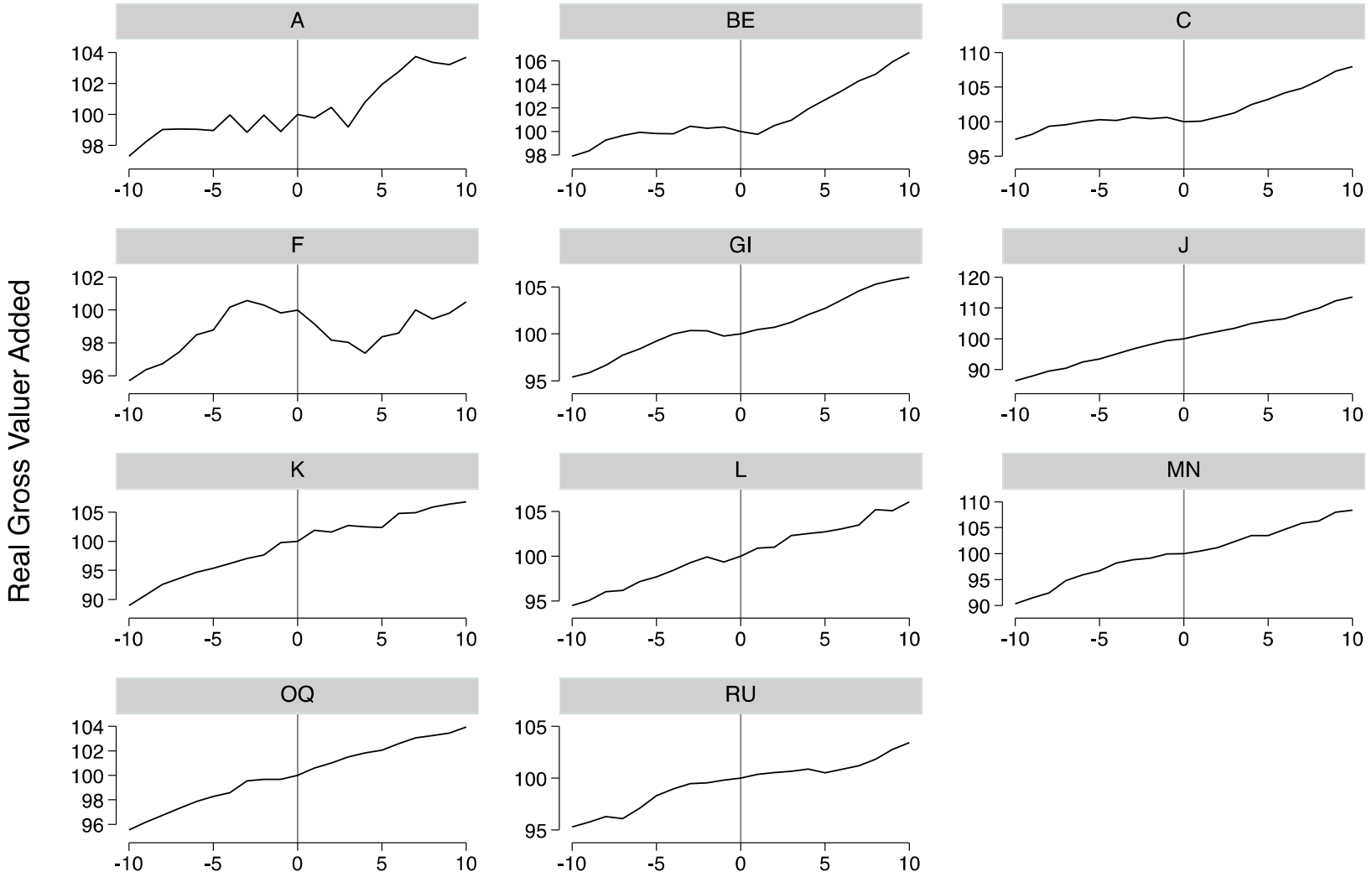
# Industrial composition

- The main constraint is collecting quarterly data on real gross value added (RGVA) at the sectoral level
- We found comparable data at the Eurostat and OECD Stats websites
- These yield RGVA data for 10+1 sectors:
  - A: Agriculture, forestry and fishing
  - B-E: Industry (C: Manufacturing)
  - F: Construction
  - G-I: Wholesale and retail trade, transport, accommodation and food service activities
  - J: Information and communication
  - K: Financial and insurance activities
  - L: Real estate activities
  - M-N: Professional, scientific and technical activities; administrative and support service activities
  - O-Q: Public administration, defence, education, human health and social work activities
  - R-U: Arts, entertainment and recreation; other service activities; activities of household and extra-territorial organizations and bodies

# A sudden stop event

- We follow an event study methodology, where we compare RGVA before and after a sudden stop starts
- The event window is 21 quarters, 10 before and 10 after the onset of a sudden stop
- We normalize the level of RGVA for each event to 100% at the start of a sudden stop
- For each of the 83 suddens tops in the sample, we create a time series with 21 observations and use the resulting panel data for estimation
- We also create a "synthetic" sudden stop episode by averaging across episodes, yielding a single time series with 21 observations

# Sudden stops: synthetic events at the sectoral level



# Regressions

- We run two sets of regressions, for each sector separately
- First, we use the synthetic episodes

$$y_t^j = \alpha_0^j + \alpha_1^j s_t + \alpha_2^j t + \alpha_3^j s_t t + \epsilon_t^j$$

- Second, we run similar panel regressions

$$y_{i,t}^j = \beta_0^j + \beta_1^j s_{i,t} + \beta_2^j t + \beta_3^j s_{i,t} t + \eta_i^j + \epsilon_{i,t}^j$$

- $y^j$: log of sectoral RGVA, $s_t$: positive after a sudden stop ($t \geq 0$), $t$: time trend, $\eta_i^j$: episode fixed effect

# Time series regressions I

| SECTORS | A | B-E | C | F | G-I | J |
|---|---|---|---|---|---|---|
| **Trend** | 0.173** | 0.257*** | 0.324*** | 0.570*** | 0.598*** | 1.569*** |
| | (0.0753) | (0.0392) | (0.0475) | (0.0899) | (0.0535) | (0.0419) |
| **Episode** | -0.506 | -1.736*** | -2.187*** | -3.161*** | -1.982*** | -1.468*** |
| | (0.606) | (0.315) | (0.382) | (0.723) | (0.431) | (0.338) |
| **Episode x Trend** | 0.293*** | 0.445*** | 0.497*** | -0.441*** | 0.0476 | -0.320*** |
| | (0.0996) | (0.0518) | (0.0628) | (0.119) | (0.0708) | (0.0555) |
| **Constant** | 460.4*** | 461.5*** | 462.0*** | 462.1*** | 462.1*** | 461.7*** |
| | (0.467) | (0.243) | (0.295) | (0.558) | (0.332) | (0.26) |
| **Observations** | 21 | 21 | 21 | 21 | 21 | 21 |
| **R-squared** | 0.893 | 0.981 | 0.98 | 0.73 | 0.979 | 0.998 |

# Time series regressions II

| SECTORS | K | L | M-N | O-Q | R-U |
|---|---|---|---|---|---|
| **Trend** | 1.129*** | 0.632*** | 1.168*** | 0.496*** | 0.577*** |
| | (0.0662) | (0.0413 | (0.0603) | (0.0221) | (0.0505) |
| **Episode** | -0.282 | -0.666* | -2.303*** | -0.411** | -1.042** |
| | (0.533) | (0.332) | (0.486) | (0.177) | (0.406) |
| **Episode x Trend** | -0.503*** | -0.0786 | -0.335*** | -0.123*** | -0.293*** |
| | (0.0876) | (0.0546) | (0.0798) | (0.0292) | (0.0668) |
| **Constant** | 461.2*** | 461.3*** | 462.5*** | 461.2*** | 461.3*** |
| | (0.411) | (0.256) | (0.374) | (0.137) | (0.313) |
| **Observations** | 21 | 21 | 21 | 21 | 21 |
| **R-squared** | 0.989 | 0.99 | 0.991 | 0.995 | 0.966 |

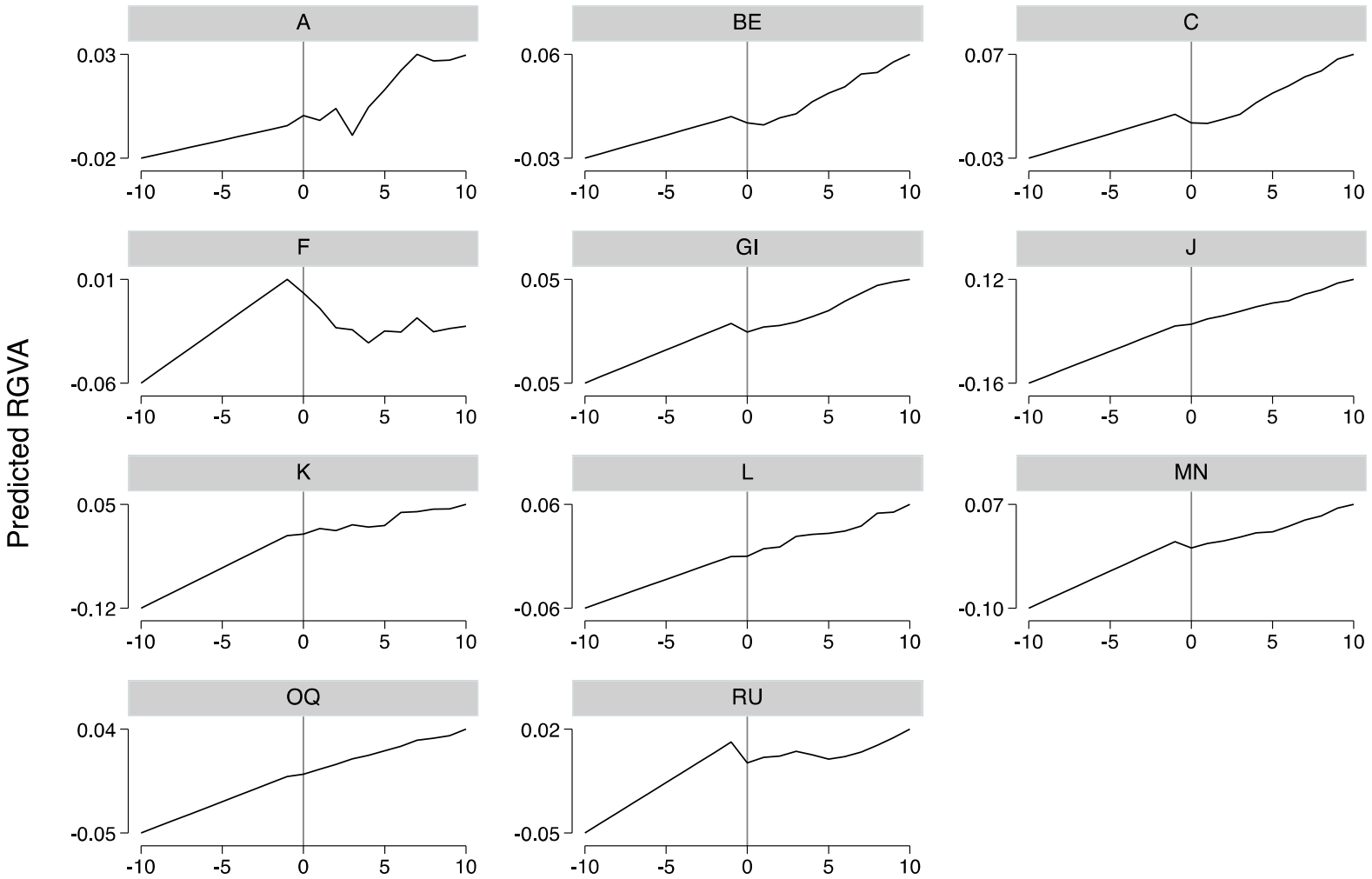
# Panel regressions I

| SECTORS | A | B-E | C | F | G-I | J |
|---|---|---|---|---|---|---|
| **Trend** | 0.245** | 0.336*** | 0.423*** | 0.721*** | 0.623*** | 1.638*** |
| | (0.102) | (0.0896) | (0.101) | (0.138) | (0.0681) | (0.0957) |
| **Episode** | -0.464 | -1.760** | -2.249*** | -3.116*** | -1.933*** | -1.417* |
| | (0.822) | (0.721) | (0.814) | (1.109) | (0.548) | (0.770) |
| **Episode x Trend** | 0.161 | 0.315*** | 0.330** | -0.828*** | -0.0161 | -0.478*** |
| | (0.135) | (0.119) | (0.134) | (0.182) | (0.0901) | (0.127) |
| **Constant** | 460.1*** | 461.5*** | 461.9*** | 462.1*** | 462.1*** | 461.7*** |
| | (0.634) | (0.556) | (0.628) | (0.855) | (0.423) | (0.594) |
| **Episode FE** | YES | YES | YES | YES | YES | YES |
| **Observations** | 1,743 | 1,743 | 1,743 | 1,743 | 1,743 | 1,743 |
| **R-squared** | 0.045 | 0.094 | 0.099 | 0.017 | 0.221 | 0.511 |
| **Number of id** | 83 | 83 | 83 | 83 | 83 | 83 |

# Panel regressions II

| SECTORS | K | L | M-N | O-Q | R-U |
|---|---|---|---|---|---|
| **Trend** | 1.242*** | 0.647*** | 1.235*** | 0.502*** | 0.763*** |
| | (0.124) | (0.0696) | (0.106) | (0.0398) | (0.203) |
| **Episode** | -0.551 | -0.571 | -2.419*** | -0.382 | -2.517 |
| | (0.995) | (0.560) | (0.854) | (0.320) | (1.637) |
| **Episode x Trend** | -0.756*** | -0.124 | -0.499*** | -0.143*** | -0.549** |
| | (0.164) | (0.0921) | (0.140) | (0.0526) | (0.269) |
| **Constant** | 461.2*** | 461.2*** | 462.6*** | 461.1*** | 462.8*** |
| | (0.768) | (0.432) | (0.659) | (0.247) | (1.262) |
| **Episode FE** | YES | YES | YES | YES | YES |
| **Observations** | 1,701 | 1,743 | 1,701 | 1,743 | 1,638 |
| **R-squared** | 0.212 | 0.257 | 0.259 | 0.369 | 0.017 |
| **Number of id** | 81 | 83 | 81 | 83 | 78 |

# Panel estimation with time dummies



# Summary of the effects

| | | **Growth effect** | | |
|---|---|---|---|---|
| | | Positive | Not significant | Negative |
| **Level effect** | Positive | - | - | - |
| | Not significant | - | A, L | K, O-Q, R-U |
| | Negative | B-E, C | G-I | F, J, M-N |