Automation and wages: a 2 way-street

- **1st challenge:** measuring innovation in automation technologies.
  - We develop a classification of patents in machinery as automation / non-automation using text data.
  - Routine tasks decline in sectors with higher automation intensity (share of automation patents in machinery).

- **2nd challenge:** addressing reverse causality.
  - Cross-country regressions are not informative!
Automation increases with low-skill labor costs

- Use firm-level patent data and labor costs data from 41 countries between 1995 and 2009.

- Measure whether firms (equipment producers) more exposed to rising low-skill labor costs also experience more automation innovations.
  - If Siemens sells more to Japan than Robert Bosch and Japanese low-skill wage rise, how many extra patents will Siemens have in automation technology compared to Robert Bosch?

- A 10% increase in low-skill wages associated with around 20% more automation patents.
Automation decreased with the Hartz reform

- Similarly measure the effect of the Hartz reform on (non-German) equipment producers according to their exposure to the German market.

- A firm with 10% exposure to Germany reduces its automation innovation relative to non-automation innovations by 20% in 2007 relative to 2005 compared to a firm with no German exposure.
Consequences

1. Automation should rise over time.
   - Decline in the labor share.
   - Rise in skill wage premium

2. Redistributive policies have different dynamic effects depending on their effect on labor costs.