

Labor income in times of digital revolution

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Overview

- Analysis of labor income in times of massive internet growth
- Evaluation of the pertinent literature and identification of five impact channels
- Econometric analysis based on these insights

Content

- 1 Discussion of internet effects in the literature
- 2 The Five impact channels of the internet
- 3 Methodology
- 4 Empirical Results
- 5 Conclusion

Productivity

- Clear evidence of a positive and significant effect of investment into ICT on productivity (> 100 studies)
- Recent evidence for a positive and significant effect of e-commerce size on productivity

Wages

- Two influential technology-based explanations for patterns: SBTC and Task Framework
- 80s,90s: German wage data can be explained by SBTC in the upper part, lower part better explained by institutional changes
- After mid 90s: Increasing wage inequality in lower part (50-10 gap) contradicts U-shape hypothesis (Task Framework).

Software-mediated markets

- Market entry easier (Lower transactions costs and network markets)
 - Topology of web favors superstardom
 - Demand side scales of economy for users of online platforms
- ⇒ No general and simple indications for competitiveness, wages, etc.

The Five impact channels of the internet

- A) Globalization Reinforcement
 - E-commerce reduces international trade barriers
 - Strong correlation of export behavior and internet access (SMEs!)
 - \Rightarrow Internet growth is a driver of globalization
 - \Rightarrow German exporting middle-class (engineers) positively affected
- B) Market Access Simplification
 - No general indications.
 - SMEs, self-employed: Lower marketing costs, market access easier.
 - Examples: Customization and personification of products, regionally confined relevant markets.

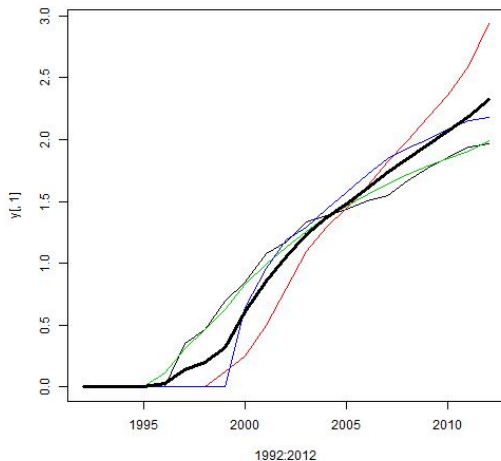
The five impact channels of the internet

- C) Transparency Enhancement
 - Customers: Information on prices and quality
⇒ Price pressure on sectors retail, hotel & tourism, gastronomy, transport
 - Sellers: Increased knowledge on customer → Price differentiation.
⇒ PR, marketing, advertising positively affected.
- D) Direct Replacement
 - Customer infomediaries: presvergleich.de, hostelbookers.de
 - Virtual marketplaces: Amazon, Alibaba
 - Other forms of e-commerce, brokerage
 - General phenomenon: Disintermediation and re-intermediation
- E) Direct channel
 - IT related occupations natural winners of Internet growth

Methodology

- Forming three wage time series ("Winner", "Losers", "Rest"), based on the five impact channels.
- Building a "Size of Internet" time series
- Since there are unit-roots and cointegration, we model the data by a vector error correction model.
- Impulse response analysis with bootstrapped CIs is provided.

Data and empirical Pre-Analysis



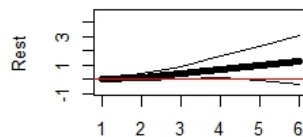
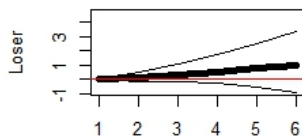
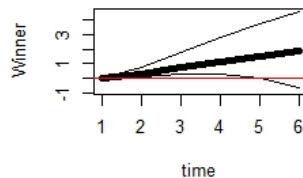
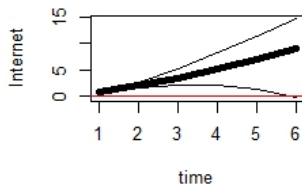
Empirical Results - Stochastic trends in income

- Unit-roots can not be rejected with an ADF-test.
- Stationary around a deterministic trend can be rejected by means of a KPSS-test.
- Johansen procedure leads to a cointegration rank of two.

Empirical Results - Point estimates

$$\Delta \begin{pmatrix} I \\ W \\ L \\ R \end{pmatrix}_t = \begin{pmatrix} 5.11 \\ 6.70 \\ 0 \\ 5.6 \end{pmatrix} + \begin{pmatrix} 0.039 & 1.066 & 0.551 & -2.157 \\ 0.120 & -0.406 & 0.701 & -0.961 \\ -0.00005 & 0.002 & 0.0003 & -0.003 \\ 0.063 & 0.667 & 0.603 & -1.855 \end{pmatrix} \begin{pmatrix} I \\ W \\ L \\ R \end{pmatrix}_{t-1} + \begin{pmatrix} 0.469 & 0 & 0 & 0 \\ 0.252 & 0.536 & -0.724 & 0 \\ 0.153 & 0.138 & -0.377 & 0 \\ 0.120 & 0 & -0.294 & 0 \end{pmatrix} \Delta \begin{pmatrix} I \\ W \\ L \\ R \end{pmatrix}_{t-1} + u_t.$$

Empirical Results - Impulse-Response



Comparison of our results with the literature on German wage inequality

- We extend the discussion about computerization and wage polarization by the aspect of the effects of massive internet growth of the last two decades, adding another driver of the noticed development.
- We apply an econometric method to quantify the dynamics and relationships of the four time series.

Conclusion

- Shocks in "Size of Internet" have a significant impact on the labor market (in the estimated model).
- The amount of the responses to a shock highly depend on the occupational group, which can be explained by the five identified impact channels.
- The discussion on changes in the wage distribution of Germany are extended by another aspect of technological change.