

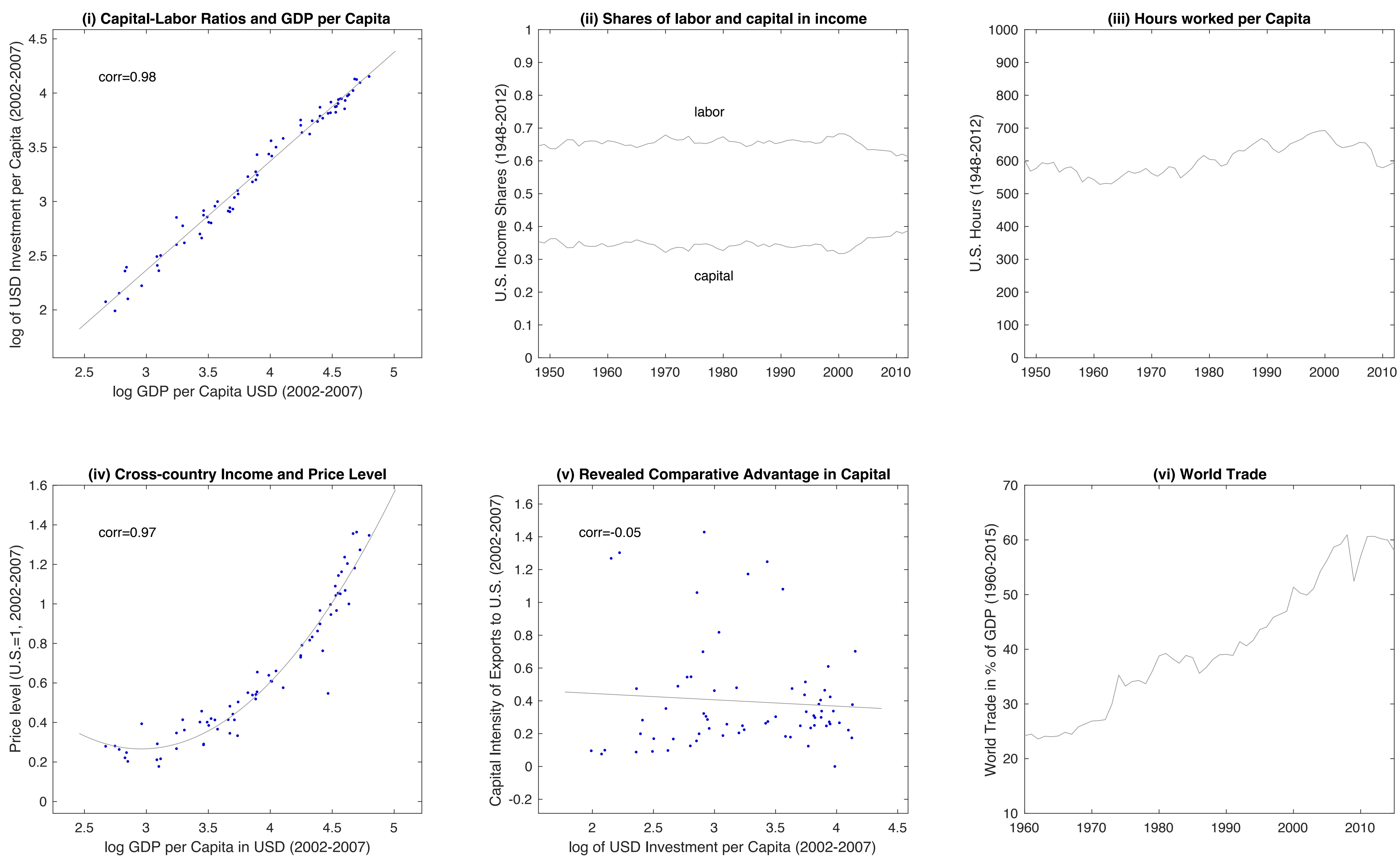
# On the Interaction of Growth, Trade and International Macro

by Clemens C. Struck

clemens.struck@ucd.ie

**Abstract.** Standard economic theories have severe difficulties in simultaneously explaining a number of key aggregate empirical facts: i) there are substantial differences in capital-labor ratios across space and time ii) despite continuously increasing capital-labor ratios, both factors still earn non-negligible shares in income iii) labor hours per capita are rather stable amid expanding consumption possibilities iv) price levels are higher in more developed countries v) there are no large gains from factor-proportions trade vi) the world trade-to-output ratio increases over time. I argue that standard economic theories ignore the vast improvements in goods quality and new products. I present an augmented standard model that incorporates these features and can jointly rationalize these six empirical facts.

## 1. Empirical Evidence



## 2. Theoretical Explanation

- Relation between quality-*unadjusted* output,  $q_{n,i,t}$  and quality-adjusted output,  $Q_{n,i,t}$  is given by:  $Q_{n,i,t} = \Phi_{i,t} q_{n,i,t}$
- Sophistication of goods of country  $i$ ,  $\Phi_{i,t}$  linearly depends on the level of development,  $A_{i,t}$ :  $\Phi_{i,t} = \gamma A_{i,t}$
- Capital and labor are imperfect substitutes:  $q_{i,t} = [k_{i,t}^{(\theta_{KL}-1)/\theta_{KL}} + l_{i,t}^{(\theta_{KL}-1)/\theta_{KL}}] \theta_{KL} / (1-\theta_{KL})$
- Capital accumulation is given by:  $k_{i,t+1} = (1 - \delta)k_{i,t} + \frac{1}{\Phi_{i,t}} I_{i,t}$
- Quality-adjusted resource constrained (balanced trade):  $Q_{i,t} = Y_{i,t} = I_{i,t} + C_{i,t}$
- Utility function:  $U_{i,t} = \sum_{s=0}^{\infty} \beta^{t+s} (C_{i,t+s} / a C_{i,t+s-1})^{1-\phi} / (1-\phi) - l_{i,t}^{1+\phi_L} / (1+\phi_L)$
- Goods are imperfect substitutes between countries:  $Y_{i,t} = \left[ (1 - \omega_{i,t})^{1/\theta} [Y_{i,t}^i]^{(\theta-1)/\theta} + (\omega_{i,t})^{1/\theta} [Y_{i,t}^j]^{(\theta-1)/\theta} \right]^{\theta/(\theta-1)}$
- Non-homothetic preferences:  $\omega_{i,t} = (e^{-\ln(A_{j,t}) - \ln(A_{i,t})} / z) \times \frac{Q_{j,t}}{Q_{i,t} + Q_{j,t}}$

- **Causality.** fact (i) capital-to labor ratio grows when capital is quality-adjusted and labor is not. Quality *unadjusted* capital-labor ratio is flat. fact (ii) capital and labor are equally scarce in quality-*unadjusted* terms. fact (iii) improvements in product quality, not the level of consumption per se motivate people to work. fact (vi) product quality is higher in more developed countries. fact (v) quality *unadjusted* capital and labor are equally scarce, hence no price differential across countries. fact (vi) convergence between developed and developing raises preference for trade of non-homothetic consumers.