

The Global Impact of Chinese Growth

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Two Observations on the Chinese Economy

- Chinese economy opened up in 1978:
 - $\frac{\text{Trade Volume}}{\text{GDP}} \uparrow$ from 10% to 40 + % very rapidly
- Chinese output growth accelerated about the same time:
 - GDP per EAP 1978–2005 is 8.5%, up from 2.5%

Questions

- How did these two observations come about?
- What were the effects on China and the ROW?
 - Short run and long run macroeconomic indicators
 - Welfare

Theory and Methodology

- Standard Growth Model
- Two-country, two-good, Backus, Kehoe, and Kydland (1994)
- Calibrated to observations between 1950-2004
- A final balanced growth path is assumed far into the future
- Key targets drive the calibration exercise
- An equilibrium transition path, triggered by surprises from nature and policy
- Characterization of this path and welfare

Main Findings

- By construction: sudden drop in home bias and gradual increase in productivity growth generate:
 - sudden increase in openness
 - rapid output growth
- In other words, a relatively simple neoclassical growth model can account for these two key observations.
- Counterfactual experiments:
 - Only a drop in home bias:
 - Welfare in China rises; little effect on the ROW
 - Only an increase in productivity:
 - Welfare in China and the ROW increase
 - Conclusion: To the extent that China's opening up led to the increase in Chinese productivity growth, everybody benefitted.

Restricting factor: Data on the Chinese economy

- Coleman (2007)
 - Static model in which an emerging giant produces and exports certain goods, and they become relatively cheaper.
 - This leads some industries in other countries around the world to expand and others to contract.
 - During China's recent emergence:
 - Japan, Hong Kong, Singapore, South Korea, Malaysia, Thailand, Philippines, Indonesia, Australia, India, and Taiwan reallocated employment away from producing manufacture goods towards service goods.
- Dekle and Vandenbroucke (2006)
 - Two-good, three sector model
 - Exogenous driving forces: productivities in the three sectors, gov share of employment
 - Equilibrium paths for: output growth and the reallocation of labor into the three sectors

Model

Households

- Two-country, two-good, Backus, Kehoe, and Kydland (1994)
- Households in each country like its own consumption good and leisure

$$U_i = \sum_{t=0}^{\infty} \beta^t (\Psi_i \log c_{i,t} + (1 - \Psi_i) \log(1 - l_{i,t}))$$

$$c_{i,t} + x_{i,t} + rer_{i,t} Q_t \Gamma d_{i,t+1} = w_{i,t} l_{i,t} + r_{i,t} k_{i,t} + T_{i,t} + rer_{i,t} d_{i,t}$$

- $rer_{i,t}$ for $i = C$ is $rer_{C,t}$ and $rer_{i,t} = 1$ for $i = R$.

Model

Technology: Intermediate Goods

- China produces a
- ROW produces b
- Each country uses

$$y_{i,t} = \exp(z_{i,t}) k_{i,t}^{\theta} l_{i,t}^{1-\theta}$$

$$\Gamma k_{i,t+1} = (1 - \delta) k_{i,t} + x_{i,t}$$

- $a_{C,t}$: amount of good a used in producing the Chinese final consumption good
- $b_{C,t}$: amount of good b used in producing the Chinese final consumption good
- $a_{R,t}$: amount of good a used in producing the ROW final consumption good
- $b_{R,t}$: amount of good b used in producing the ROW final consumption good

Model

Technology: Final Goods

$$G_{C,t} = \left(\eta_{C,t} a_{C,t}^{\frac{\varepsilon-1}{\varepsilon}} + (1 - \eta_{C,t}) b_{C,t}^{\frac{\varepsilon-1}{\varepsilon}} \right)^{\frac{\varepsilon}{\varepsilon-1}}$$

$$G_{R,t} = \left((1 - \eta_{R,t}) a_{R,t}^{\frac{\varepsilon-1}{\varepsilon}} + \eta_{R,t} b_{R,t}^{\frac{\varepsilon-1}{\varepsilon}} \right)^{\frac{\varepsilon}{\varepsilon-1}}$$

$$T_{i,t} = \begin{cases} \tau_{C,t} p_{C,t}^b b_{C,t} & \text{for } i = C \\ 0 & \text{for } i = R \end{cases}$$

Resource Constraints

Intermediate Goods

$$a_{C,t} + \frac{1 - \pi}{\pi} a_{R,t} = y_{C,t}$$

$$\frac{\pi}{1 - \pi} b_{C,t} + b_{R,t} = y_{R,t}$$

Resource Constraints

Final Goods

$$\begin{aligned}c_{i,t} + x_{i,t} &= G_{i,t} \\ \pi d_{C,t} + (1 - \pi)d_{R,t} &= 0\end{aligned}$$

Calibration

General Idea

- 1950-1977 is a period of symmetric steady-state characterized by low GDP growth and low openness in China.
- Equal EAP, preference and technology parameters, targeting a capital-output ratio of 2.5 and fraction of time worked of 0.3.
 - $\beta = 0.95$ and $\Psi = 0.34$ accomplish these tasks.
- Also:
 - $\eta_C = \eta_R = 0.71$ (0.76?)
 - captures home bias
 - a reduction raises domestic demand for imported intermediate good
 - China took drastic measures in 1978 by reducing import licenses and quotas
 - $\theta = 0.33$ capital's share of income
 - $\delta = 0.035$
 - $\varepsilon = 1.5$: elasticity of substitution between C and R intermediate goods in the production of the domestic final good

Calibration and Computation

1978 and Beyond

- Assume that a final steady-state is reached by 2100
- Balanced trade is achieved throughout by selecting the tariff rate $\tau_{C,t}$ in China accordingly
- The remaining two targets: (Figure 7)
 - (detrended) GDP growth rate as 0% versus 5% at 1978 and beyond; productivity as instrument
 - Openness as 10% versus 30% at 1978 and beyond; $\eta_{C,t}$ as instrument
- Eventually, the level of Chinese TFP (5% to start with) catches up with the ROW.
- In 1978:
 - Nature reveals a faster rate of growth of productivity in China
 - Chinese government announces and immediately implements a perfectly credible openness strategy
- Numerical computation of deterministic equilibrium paths

Results

Only a Decline in Home Bias

- Openness rises, then gradually returns back to its steady-state level.
- Demand for Chinese intermediate good falls, so Chinese investment and labor (and GDP) fall.
- Balanced trade forces consumption to rise.
- Overall, welfare (CEV relative to the initial steady-state) rises in China.
- Little effect on the ROW; China's GDP is 5% of that of the ROW.

Results

Only an Increase in Productivity

- Standard effects of an increase in productivity in China: GDP, investment, consumption and labor go up.
- Welfare rises in China.
- In the ROW, improved Chinese productivity makes for cheaper Chinese intermediate goods.
- This in turn acts as a positive TOT shock to the ROW.
- Investment, labor (slightly), output and consumption rise in the ROW.
- Welfare goes up in the ROW also.

Results

Both Shocks at the Same Time

- Welfare goes up for both China and the ROW

Sensitivity Analysis:

- ε is likely to be a key parameter. At least two other values surrounding the 1.5 used in the paper would be useful.
 - When there is an exogenous change in home bias, the degree to which domestic production responds depends critically on ε .
- To 'slow down' the response of households to sudden changes in the paths of exogenous variables:
 - Capital adjustment costs; labor adjustment costs?
- η is also quite different in China and the ROW.

Ideally:

- Use reliable data on Chinese productivity and other measures of trade and openness.
- Use bi-lateral trade data.
- Examine the extent to which a standard growth model like the current one is able to explain the time path of actual Chinese and its partners' NIPA accounts.
- Use this model to evaluate welfare and to conduct counterfactuals so that policy recommendations can be obtained.
- So far, it proved difficult to construct data from the Chinese economy to implement this research strategy satisfactorily.
- The current paper is taking a bold step toward utilizing whatever is available and moving forward.

Other comments:

- Short-run analysis:
 - Starting point: Given initial conditions in 1977
 - Ending point: same as in the current version; 2100 steady-state
 - Immediate aftermath of 2004: some assumptions on how openness and productivity will pan out
 - Analyze the short-run effects till 2004, evaluate welfare
 - Conduct sensitivity analyses for assumptions regarding
 - Different starting points
 - Different final steady-state calibration
 - Different paths of exogenous variables (backed out from alternative paths of endogenous variables) in the immediate aftermath of 2004.

Deterministic versus Stochastic Simulations:

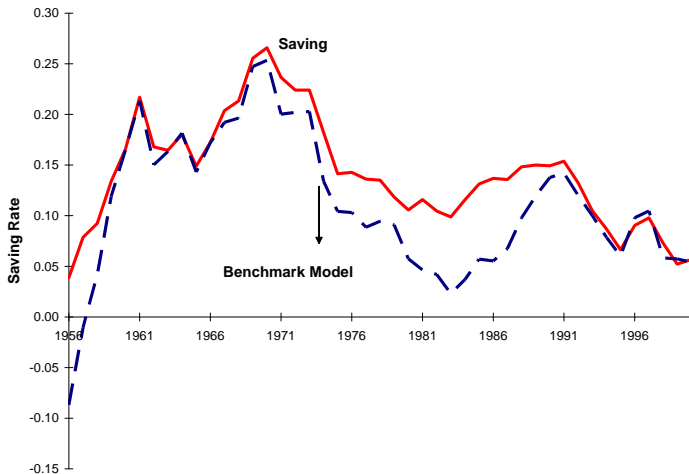


Figure 2: Benchmark Economy

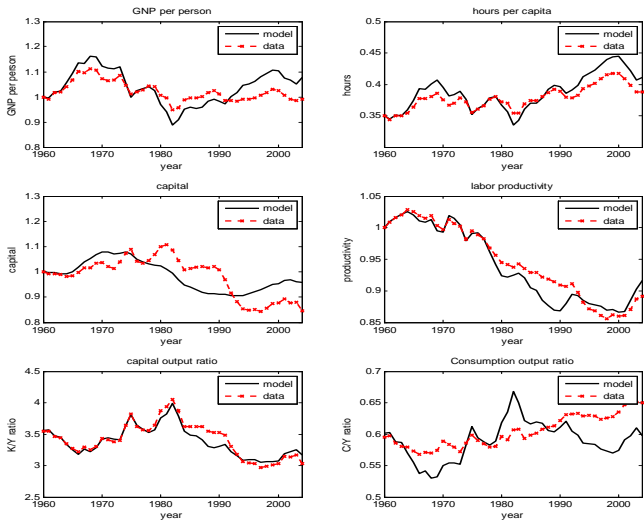


Figure: Model Properties with Varying Labor Wedge

What's Next?

- Asymmetric given initial conditions and sensitivity analysis.
- A permanent reduction in home bias in China.
- Endogenizing TFP:
 - Technology Diffusion?
 - A link from the imports of capital goods leading to an increase in the productivity of Chinese final goods production.
- Incorporating the effects of demographic transition.

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- Starting with LARGER figures and graphs to help out older readers.