The Global Impact of Chinese Growth
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Two Observations on the Chinese Economy

- Chinese economy opened up in 1978:
  - Trade Volume \( \frac{\text{Volume}}{\text{GDP}} \) ↑ 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.
Related Research

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
Two-country, two-good, Backus, Kehoe, and Kydland (1994)

Households in each country like its own consumption good and leisure

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

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

\( rer_{i,t} \) 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

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

\[
G_{R,t} = \left( (1 - \eta_{R,t}) a_{R,t}^{\frac{\varepsilon-1}{\varepsilon}} + \eta_{R,t} b_{R,t}^{\frac{\varepsilon-1}{\varepsilon}} \right)^{\frac{\varepsilon}{\varepsilon-1}}
\]
\[ T_{i,t} = \begin{cases} 
\tau C, t p^b_{C,t} b_{C,t} & \text{for } i = C \\
0 & \text{for } i = R
\end{cases} \]
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

\[ c_{i,t} + x_{i,t} = G_{i,t} \]
\[ \pi d_{C,t} + (1 - \pi) d_{R,t} = 0 \]
Calibration

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
- $\delta = 0.035$
- $\epsilon = 1.5$ : elasticity of substitution between $C$ and $R$ intermediate goods in the production of the domestic final good
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:

- $\varepsilon$ 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 $\varepsilon$.
- To ‘slow down’ the response of households to sudden changes in the paths of exogenous variables:
  - Capital adjustment costs; labor adjustment costs?
- $\eta$ 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

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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.