Sudden Stops, Sectoral Reallocations, and Real Exchange Rates

Timothy J. Kehoe
University of Minnesota
Federal Reserve Bank of Minneapolis

and

Kim J. Ruhl
University of Texas at Austin
NYU Stern School of Business
What Happens During a Sudden Stop?  
Mexico 1994-95

Opens to capital flows: late 1980s
  • trade deficits
  • real exchange rate appreciation

Sudden stop: 1994-95
  • trade surplus
  • real exchange rate depreciation
  • reallocation from nontradables to tradables
  • fall in GDP, TFP

End of sudden stop
  • trade deficits
  • real exchange rate appreciation
  • recovery of GDP, TFP
Mexico: trade balance

share of GDP (%)
Mexico-U.S. real exchange rate

log(RER)

rer

er^N

Mexico: sectoral value added

index (1994 = 100)


tradable goods
nontradable goods
Mexico: output and TFP

Graph showing the index of GDP per unit of output (1994 = 100) and Total Factor Productivity (TFP) from 1988 to 2002. The graph indicates fluctuations in both GDP per unit of output and TFP during this period.
Candidate Explanations

- labor hoarding
- variable capital utilization

Growth Accounting Discipline

Measured TFP must decline!
Our model

- Small open economy
  - multisector: tradable, nontradable
  - costly to adjust labor across sectors

- Sudden stop
  - tradable good price increase, increase production
  - capital and labor misallocated

- Model accounts for:
  - real exchange rate, relative prices
  - trade balance
  - GDP (if TFP is exogenous)

- Misses:
  - TFP, GDP
Model overview

- Growth model: small open economy

- Nontradable good, $y_N$, and domestic tradable good, $y_D$
  - production use intermediates, capital, and labor

- Composite tradable $y_{Tt} = f(y_{Dt}, m_t)$

- Frictions:
  - costly to move labor across sectors

- Quantitative model
Production functions

Domestically produced traded good

\[ y_{Dt} = \min \left[ \frac{z_{TDt}}{a_{TD}}, \frac{z_{NDt}}{a_{ND}}, A_D k_D^{\alpha_D} \left( \gamma^t L_D \right)^{1-\alpha_D} \right] - \Theta_D \left( \ell_{Dt-1}, \ell_{Dt} \right) \ell_{Dt-1} \]

where \( \Theta_D \left( \ell_{Dt-1}, \ell_{Dt} \right) = \gamma^t \theta_D \left( \frac{\ell_{Dt} - \ell_{Dt-1}}{\ell_{Dt-1}} \right)^2 \)

Nontraded good

\[ y_{Nt} = \min \left[ \frac{z_{TNt}}{a_{TN}}, \frac{z_{NNt}}{a_{NN}}, A_N k_N^{\alpha_N} \left( \gamma^t L_N \right)^{1-\alpha_N} \right] - \Theta_N \left( \ell_{Nt-1}, \ell_{Nt} \right) \ell_{Nt-1} \]

where \( \Theta_N \left( \ell_{Nt-1}, \ell_{Nt} \right) = \gamma^t \theta_N \left( \frac{\ell_{Nt} - \ell_{Nt-1}}{\ell_{Nt-1}} \right)^2 \)
Composite traded good (Armington aggregator)

\[ y_{Tt} = M \left( \mu x_{Dt} + (1 - \mu) m_t^\zeta \right)^{\frac{1}{\zeta}} \]

Investment good

\[ i_{Dt} + i_{Nt} = \Phi z^{\phi}_{Tlt} z^{1-\phi}_{Nlt} \]

\[ k_{Dt+1} = i_{Dt} + (1 - \delta) k_{Dt} \]

\[ k_{Nt+1} = i_{Nt} + (1 - \delta) k_{Nt} \]

Market clearing, balance of payments
Exogenous processes

• Country risk premia, $\sigma_t^{mex}$

  1. with access to international capital

      \[ r_t^{mex} = r^* + \sigma_t^{mex} \]

  2. without access to international capital

      \[ r_t^{mex} \text{ is domestically determined} \]

• Populations, $n_t$, and working age population, $\ell_t$

• Mexican tariff rates, $\tau_{D_t}$, and world tariff rates, $\tau_{F_t}$
Mexico: interest rates

Annual interest rate

Belief in no sudden stop case

Data
Sudden stop!

\[ b_t = b_{t-1}, \ t = 1995, 1996 \]

• agents do not foresee sudden stop

• agents do foresee length of sudden stop

• domestic interest rate is endogenously determined

• interest payments on foreign debt made at \( r^* \)
Mexico: trade balance

<table>
<thead>
<tr>
<th>Year</th>
<th>Trade Balance</th>
</tr>
</thead>
<tbody>
<tr>
<td>1988</td>
<td>-6.00</td>
</tr>
<tr>
<td>1990</td>
<td>-4.00</td>
</tr>
<tr>
<td>1992</td>
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<td>1996</td>
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<tr>
<td>1998</td>
<td>4.00</td>
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</tbody>
</table>

Model

Data
Mexico: real exchange rates

Data

Model

log(RER)
Mexico: nontraded/traded good prices

Model

Data

log(RERN)

Mexico: sectoral value added

Model

Data

tradable goods
nontradable goods

index (1994 = 100)
How important are labor frictions?

- Remove labor frictions, leave all else unchanged.
Variable Capital Utilization

• law of motion

\[ k_{D,t+1} = \left(1 - \phi^{-1} u_{D,t}^{\phi} \right) k_{D,t} + i_{D,t} \]

\[ k_{N,t+1} = \left(1 - \phi^{-1} u_{N,t}^{\phi} \right) k_{N,t} + i_{N,t} \]

• during crisis utilization of nontradable capital falls

• standard growth accounting:

falling utilization = falling $TFP$
Mexico: Total Factor Productivity

![Graph showing Mexico's Total Factor Productivity from 1988 to 2002. The index (1994 = 100) is depicted with a red line representing data and a blue dashed line representing a model.](graph.png)
Accounting for GDP

- Take TFP drop as exogenous
- robustness check: TFP drops **DO NOT** cause sudden stops

\[
y_{Dt} = \min \left[ \frac{z_{TDt}}{a_{TD}}, \frac{z_{NDt}}{a_{ND}}, A_D k_{Dr}^{\alpha_D} \left( (v_t \gamma)^{\tau} \ell_{Dr} \right)^{1-\alpha_D} \right] - \Theta_D (\ell_{Dt-1}, \ell_{Dt}) \ell_{Dt-1}
\]

\[
y_{Nt} = \min \left[ \frac{z_{TNt}}{a_{TN}}, \frac{z_{NNt}}{a_{NN}}, A_N k_{Nt}^{\alpha_N} \left( (v_t \gamma)^{\tau} \ell_{Nt} \right)^{1-\alpha_N} \right] - \Theta_N (\ell_{Nt-1}, \ell_{Nt}) \ell_{Nt-1}.
\]

\[
v_t = \begin{cases} 
1.0 & t < 1995 \\
0.86 & t \geq 1995
\end{cases}
\]

- All else same
Mexico: trade balance

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Model

Data

share of gdp (%)