Global Imbalances and Structural Change in the United States

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U.S. trade balance vs. employment share in goods production
Key questions:

- How much of the decline in employment is from borrowing?
  - Borrowing generates goods from rest of world
  - Trade deficits shift production from goods to nontradables/services
  - Ending borrowing increases employment in goods production

- How much of the decline in employment is from structural change?
  - Productivity grows faster in goods production
  - Elasticity of substitution between goods and services is low
  - (Fraction of income spent on services goes up with income)
  - Structural change is studied in a closed economy

- What are the welfare implications of U.S. borrowing?
Global saving glut

Why is the United States, with the world’s largest economy, borrowing heavily on international capital markets — rather than lending, as would seem more natural? ...[O]ver the past decade a combination of diverse forces has created a significant increase in the global supply of saving — a global saving glut — which helps to explain both the increase in the U.S. current account deficit and the relatively low level of long-term real interest rates in the world today.

Ben S. Bernanke (2005)

- Large literature seeks to explain saving glut
  - Example: Financial integration with asymmetric financial development (Mendoza et al. 2009; Caballero et al. 2008)

- We take saving glut as given and focus on its impact on labor allocation and other macro variables and in the U.S. economy over the past 20 years and into the future.
What we do

- Build dynamic general equilibrium model of United States and the rest of the world.
- Interpret saving glut as period of increased foreign demand for U.S. bonds.
- Incorporate differences in productivity growth across sectors.
- Show that model is consistent with key facts about U.S. economy since 1992.
- Use counterfactual experiment without saving glut to calculate impact of saving glut on macro aggregates and welfare.
  - Emphasize reallocation effects on goods, services, construction sectors.
- Assess impact of end to saving glut.
- Perform sensitivity analysis.
Driving forces in model

Global saving glut — exogenous saving shock in rest of the world.

Productivity differences across sectors — observed growth rates imposed exogenously since 1992 and into the future.
Labor productivity in goods, services, and construction
Summary of results: Goods-sector employment

Saving glut accompanied by decline in goods employment

Will labor compensation/employment return to goods production when United States starts running trade surpluses to repay debt?
Summary of result: Goods-sector employment

Saving glut accompanied by decline in goods employment

Will labor compensation/employment return to goods production when United States starts running trade surpluses to repay debt?

No!

Most of allocation of labor out of goods production is due to structural change, not to saving glut

Services trade reduces need to export goods to repay debt
Summary of results: Welfare

Have U.S. households benefited from global saving glut?
Summary of results: Welfare

Have U.S. households benefited from global saving glut?

Yes!

U.S. households are much better off after 20 years of foreign lending and cheap foreign goods.
3 key facts about U.S. economy since 1992
Aside: Real exchange rate

- Real exchange rate measures how many U.S. baskets of goods and services trade for a foreign basket of goods and services.


- When U.S. real exchange rate rises, more U.S. CPI baskets needed to purchase a foreign CPI basket — U.S. real exchange rate depreciates.
Fact 1: U.S. real exchange rate appreciates, then depreciates
Fact 2: Dynamics of trade deficit are driven by deficits in goods trade
Fact 3: Labor in goods declines, and there is a boom in construction
Open question:

Why are average wages and salaries higher in goods and construction than in services?
Model

3 production sectors
- Goods
- Services
- Construction

5 sets of agents
- US households
- US firms
- US government
- RW households
- RW firms
US households maximize utility subject annual budget constraint
• work and consume,
• save or borrow by buying or selling bonds and claims to capital.

US firms maximize profits
• produce goods, services, and construction using intermediate inputs and inputs of capital and labor,
• produce investment using goods, services, and construction.

US government
• taxes US households,
• consumes goods and services according to a spending rule,
• sells new bonds and pays off old bonds.

…and similarly in rest of world

In equilibrium, prices adjust so that supply equals demand for goods, services, and construction, for factors of production, and for bonds.
Parameterization

Model is calibrated so that agents carry out same transactions in model in 1992 as they did in data in 1992.

We also need to project trends for some parameters over time.

Most important parameters that drive model’s dynamics:

- Productivity growth in goods, services, and construction are calibrated using 1988–2012 data.

- Rest of world’s savings behavior is calibrated to match U.S. trade balance.
### 1992 input-output matrix (U.S. GDP = 100)

<table>
<thead>
<tr>
<th></th>
<th>Intermediate inputs</th>
<th>Final demand</th>
<th>Gross output</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>USA</td>
<td>ROW</td>
<td>USA</td>
</tr>
<tr>
<td><strong>Goods</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Goods</td>
<td>21.52 9.96 3.14</td>
<td>3.10 1.14</td>
<td>0.00 0.00</td>
</tr>
<tr>
<td>Services</td>
<td>11.74 39.23 2.99</td>
<td>0.90 1.35</td>
<td>0.00 0.00</td>
</tr>
<tr>
<td>Construction</td>
<td>0.00 0.00 0.00</td>
<td>0.00 0.00</td>
<td>0.00 0.00</td>
</tr>
<tr>
<td><strong>Goods</strong></td>
<td>3.17 1.11 0.33</td>
<td>89.56 41.13</td>
<td>0.00 0.00</td>
</tr>
<tr>
<td>Services</td>
<td>0.44 1.08 0.10</td>
<td>42.59 88.67</td>
<td>0.19 0.05 0.02</td>
</tr>
<tr>
<td>Value added</td>
<td>19.55 76.96 3.50</td>
<td>85.18 206.22</td>
<td>0.00 0.00 0.00</td>
</tr>
<tr>
<td><strong>Gross output</strong></td>
<td>56.41 128.33 10.05</td>
<td>221.33 338.51</td>
<td>64.47 16.05 20.02</td>
</tr>
</tbody>
</table>
Important parameters

Elasticities of substitution between domestic inputs and imports are 2.0 for goods and 1.0 for services in consumption, 3.0 for goods and 1.0 for services in intermediate use.

Parameters imply U.S. goods trade deficit, services trade surplus.

Labor productivity in goods grows faster (4.4% per year) than in services (1.3%).

Elasticity between goods and services is 0.65 in consumption, 0.04 in intermediate use.
Open question:

Was some of the growth in productivity in goods due to the trade deficit?
RW’s savings behavior is calibrated to generate saving glut.
How well does the model perform 1992–2012?
Fact 1: U.S. real exchange rate appreciates, then depreciates
Fact 2: Dynamics of trade deficit are driven by deficits in goods trade
Fact 3: Labor in goods declines, and there is a boom in construction
Sensitivity analysis

To capture J-curve, we insert “trade wedges” as in Alessandria, Kaboski, and Midrigan (2012) to simultaneously capture US trade deficit and real exchange rate movements.

We make utility functions in US and RW nonhomothetic as in Buera and Kaboski (2009).

We make different assumptions on production structure of model.
Distinctive features of production structure

In input-output matrix, goods are disproportionately larger in intermediate use than services.

Elasticities of substitution between inputs in intermediate use are smaller than in consumption.
## Goods sector’s employment share
(Percent observed decline)

<table>
<thead>
<tr>
<th>Model</th>
<th>Benchmark</th>
<th>No-saving-glut</th>
<th>Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>baseline</td>
<td>69.9</td>
<td>55.0</td>
<td>14.9</td>
</tr>
<tr>
<td><strong>Models with additional features to improve fit</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>trade wedges</td>
<td>64.0</td>
<td>55.0</td>
<td>8.9</td>
</tr>
<tr>
<td>nonhomothetic preferences</td>
<td>76.7</td>
<td>61.0</td>
<td>15.7</td>
</tr>
<tr>
<td><strong>Models with alternative input-output matrices</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>no-IO, baseline consumption elasticity</td>
<td>27.9</td>
<td>18.4</td>
<td>9.5</td>
</tr>
<tr>
<td>no-IO, baseline intermediate elasticity</td>
<td>49.8</td>
<td>37.2</td>
<td>12.6</td>
</tr>
<tr>
<td>GDP proportional to GO in U.S. sectors</td>
<td>62.3</td>
<td>50.3</td>
<td>11.9</td>
</tr>
</tbody>
</table>
Goods employment share in trade-wedge model
Goods employment share in nonhomothetic model

[Graph showing the percentage total labor compensation over time for different scenarios: no saving glut (baseline), benchmark (baseline), benchmark (non-homothetic), and data (non-homothetic).]
Welfare impact of saving glut

Have U.S. households been made better or worse off by saving glut?
Welfare impact of saving glut

Have U.S. households been made better or worse off by saving glut?

Saving glut benefits U.S. households by providing them with cheap credit and with cheap foreign goods for more than 20 years.

Saving glut causes real income of U.S. households to rise by 679 billion 1992 dollars, or equivalently, 10.7 percent of 1992 U.S. GDP.
Bernanke versus Obstfeld-Rogoff (2009)

Did the Chinese make us do it?

We model the source of global imbalances as being outside the United States.

What if we alter preferences of U.S. households to generate the observed borrowing?

Saving drought in the United States rather the saving glut in the rest of the world (Chinn and Ito, 2007, Gruber and Kamin, 2007).
Investment in domestic saving drought model
Puzzles and future research
U.S. real exchange rates with China and other trade partners

![Graph showing real exchange rates with China and other trade partners from 1992 to 2012.](image-url)