Financial Integration, Macroeconomic Volatility and Welfare

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IMF Annual Conference  
Washington D.C., November 2006
This paper is part of a research project aimed at enriching the financial side of international macroeconomic models.

Why?
- To provide quantitative analysis of the data, and
- a framework for policy evaluation and design.

Key Modeling Choices
- Primary vs Secondary Capital Markets
- Complete vs Incomplete Risk-Sharing

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- How does greater financial integration affect macroeconomic dynamics and welfare?
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- We interpret greater integration as giving households access to a wider array of financial assets.
- An important feature of our model is that increased integration permits greater risk-sharing, but not complete risk-sharing.
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The quantitative predictions of the model are generally consistent with the data.

- The relation between financial integration and the volatility of consumption and output is nonlinear (hump-shaped).
- Volatility of consumption output ratio increases with integration.
- Greater integration affects the distribution of conditional welfare.
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U.S. International Investment Position

Figure 1a. U.S.-owned assets abroad, % capitalization

Figure 1b. Foreign-owned assets in the U.S., % capitalization
Related Literature

Macroeconomic implications of integration:


Welfare effects of financial integration:


Portfolio Choice in DSGE models

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### Table 1. Volatility of Growth Rates of Selected Variables in the 1990s

<table>
<thead>
<tr>
<th></th>
<th>Output Y</th>
<th>Consumption C</th>
<th>Income Q</th>
<th>Total cons (C+G)</th>
<th>Ratio (C+G)/Q</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Industrial countries</strong></td>
<td>1.61</td>
<td>1.72</td>
<td>1.91</td>
<td>1.38</td>
<td>0.58</td>
</tr>
<tr>
<td><strong>MFI countries</strong></td>
<td>3.59</td>
<td>4.66</td>
<td>4.78</td>
<td>4.10</td>
<td>0.92</td>
</tr>
<tr>
<td><strong>LFI countries</strong></td>
<td>2.70</td>
<td>5.72</td>
<td>4.59</td>
<td>4.79</td>
<td>0.84</td>
</tr>
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</table>

Source: Kose et. al. (2003), Table 1.
Contribution

Provide a theoretically based assessment of the link between financial integration and macroeconomy, in a model which has a relatively standard real side:

1. Two sectors
2. Production economy
3. No rigidities or market imperfections (frictions?)

and which has a "realistic" financial side:

1. Bonds and stocks can be traded
2. Asset markets are incomplete
3. Dynamic portfolio and consumption choices
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2 countries: H and F

Firms:
- Tradable, T sector (production sector): make investment decisions, issue equity, which provides claims to T dividends, $D_t^T$, and is priced at $P_t^T$
- Nontradable, N sector (endowment sector): issue equity, which is indexed to N dividends, $D_t^N$, and is priced at $P_t^N$

Households:
- consume T and local N goods
- allocate portfolio between H and F T equity ($A_t^T, A_t^\hat{T}$), local N equity $A_t^N$, and bonds $B_t$

Three scenarios: financial autarky (FA), low integration (LI), and high integration (HI)
Model: Building Blocks

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**Model: Firms**

**T sector**: A representative H firm owns its capital stock, $K_t^T$, and produces output, $Y_t^T$, according to $Y_t^T = Z_t^T (K_t^T)^\theta$, where $Z_t^T$ is exogenous state of T productivity.

A problem facing H firm is:

$$\max_{l_t^T} \left( P_t^T + D_t^T \right),$$

subject to

$$l_t^T = K_{t+1}^T - (1 - \delta) K_t^T, \quad \text{and} \quad D_t^T = Y_t^T - l_t^T$$

**N sector**: A representative H firm produces output, $Y_t^N$, according to $Y_t^N = \kappa Z_t^N$, where $\kappa > 0$ is a constant, and $Z_t^N$ is the period $-t$ state of N productivity.
Model: Households

A representative H household solves:

$$\max \mathbb{E}_t \sum_{i=0}^{\infty} \beta^i \ln C_{t+i},$$

subject to

$$W_{t+1} = R_{t+1}^W \left( W_t - C_t^T - Q_t^N C_t^N \right),$$

where

$$R_{t+1}^W = R_t + \alpha_t^T (R_{t+1}^T - R_t) + \alpha_t^\hat{T} (R_{t+1}^\hat{T} - R_t) + \alpha_t^N (R_{t+1}^N - R_t)$$

The consumption basket at H country:

$$C_t = \left[ \lambda_T^{1-\phi} (C_t^T)^\phi + \lambda_N^{1-\phi} (C_t^N)^\phi \right]^{1/\phi},$$

where $1/(1-\phi) > 0$ is the elasticity of substitution between T and N consumption.
An equilibrium in our world comprises a set of equity prices \( \{ P^T_t, \hat{P}^T_t, P^N_t \} \), relative goods prices \( \{ Q^N_t \} \) and interest rate on bonds, \( R_t \) that clear all markets given the state of productivity, the optimal investment decisions of firms producing tradable goods, and the optimal consumption, savings and portfolios decisions of households.
Model: Equilibrium II

The following markets must clear:

1. Non-tradable good markets

\[ C_t^N = Y_t^N = D_t^N \]
\[ \hat{C}_t^N = \hat{Y}_t^N = \hat{D}_t^N \]

2. Tradable goods market

\[ C_t^T + \hat{C}_t^T = Y_t^T + \hat{Y}_t^T - I_t - \hat{I}_t \]

3. Bond market

\[ 0 = B_t + \hat{B}_t \]

4. Equity markets

- tradables:
  \[ 1 = A_t^T + \hat{A}_t^T, \quad \text{and} \quad 1 = \hat{A}_t^T + A_t^T, \]
- nontradables:
  \[ 1 = A_t^N, \quad \text{and} \quad 1 = \hat{A}_t^N \]
## Calibration

### Table 2. Model Parameters

<table>
<thead>
<tr>
<th>Category</th>
<th>Parameter 1</th>
<th>Parameter 2</th>
<th>Parameter 3</th>
<th>Parameter 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preferences</td>
<td>$\beta$</td>
<td>$\lambda_T$</td>
<td>$\lambda_N$</td>
<td>$1/(1 - \phi)$</td>
</tr>
<tr>
<td></td>
<td>0.99</td>
<td>0.5</td>
<td>0.5</td>
<td>0.74</td>
</tr>
<tr>
<td>Production</td>
<td>$\theta$</td>
<td>$\delta$</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.36</td>
<td>0.02</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Productivity</td>
<td>$a_{ii}^T$</td>
<td>$a_{ii}^N$</td>
<td>$\Omega_e$</td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.78</td>
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In response to integration, households are able to share risks better.

Table 3. Macroeconomic Volatilities and Correlations

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<td>(%) std. dev.</td>
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<td>$MRS, \overline{MRS}$</td>
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The relation between financial integration and volatility of aggregate consumption and output is non-linear.

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Volatility of $T$ consumption declines with integration. Correlation between $T$ and $N$ consumption increases with integration.

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Volatility of financial wealth declines with integration.

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Greater integration increases unconditional welfare under HI, but the effects are small. Welfare improvement between HI and FA equilibria is equivalent to a 0.006% permanent increase in consumption.

Dynamic responses of lifetime utility vary significantly across the three equilibria.
Figure 6. Conditional Expected Utility

Martin Evans, Viktoria Hnatkovska
Integration, Volatility and Welfare
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