The Valuation Channel of External Adjustment*

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Contribution of this paper

- In a two-country DSGE with monopolistic competition, flexible prices, and international equity trading, subject to a financial intermediation cost.
  - It studies the conditions that give rise to a valuation channel:
  - It analyzes the determinants of its magnitude
  - It assesses its importance for net foreign asset dynamics and consumption allocations.
  - It focuses on equity prices rather than the exchange rate, which are important quantitatively (Tille, 2005, and IMF April 2006 WEO)

Related Literature

- There are a few theoretical analyses of valuation effects that focus on the role of the exchange rate—Tille (2005), Blanchard, Giavazzi, and Sa (2005), and Devereux and Saito (2005).

- Vs. Tille (2005). Gross positions different from zero, but net position zero. Portfolio choice takes short cuts. However, we consider only equities. Steady-state net foreign assets are endogenous and can potentially differ from zero. There is a well defined portfolio choice off steady state. Consider valuation effects that arise also in a fully flexible price world.

- Vs. Blanchard et al (2005). Portfolio problem with imperfect asset substitutability without diversification motives, but model the interaction between portfolio decisions and more traditional international transmission issues (i.e., ToT, persistence of shocks).

- Vs. Devereux and Saito (2005). It's a production economy.

- Engel and Matsumoto (2005) and Kollmann (2005) are the closest to ours, but focus on home bias in equity not adjustment.

Main Results

- Gross foreign asset holding is necessary for a valuation channel to emerge.

- The magnitude of valuation effects are larger (i) the tighter the financial friction, (ii) the more substitutable home and foreign goods, and (iii) the more persistent the shocks.

- The importance of valuation effects in NFA dynamics is (i) independent from substitutability among domestic and foreign goods and (ii) is increasing in the degree of financial friction.

- Its direct quantitative impact on consumption allocations is difficult to disentangle, but seems small

- The model can match U.S. net foreign asset data moments qualitatively

- The income distribution affects risk sharing in the model, with novel consequences for optimal monetary policy in a financially integrated world.

The rest of presentation will ...

- Describe key ingredients of the model;
- Present results on valuation channel and its determinants
- Present some evidence on model performance
- Discuss model implications
- Conclude.

Model Overview

- Production economy with incomplete asset markets and no government:
  - Equities are claims on streams of "pure" profits not country's GDPs
  - Firms make explicit pricing decision, and ToT are endogenous
- Portfolio choice depends on time-varying expected returns adjusted for financial intermediation costs, but not on second moments.
  - No diversification motive, but risk sharing and consumption smoothing motives
  - Asset "supply" considerations can play a role

– Owing to the intermediation costs, well defined portfolio decision in and off the steady state.

The Model Ingredients

- Two perfectly symmetric countries, all prices are flexible

- Home households maximizes:

$$E_t \sum_{s=t}^{\infty} \beta^{s-t} \left[\frac{\left(C_s^j\right)^{1-\frac{1}{\sigma}}}{1-\frac{1}{\sigma}} \right], \quad 1 > \beta > 0,\ \sigma, \chi > 0.$$

- Two goods model:

$$C_t^j = \left[a^{\frac{1}{\omega}} \left(C_{Ht}^j\right)^{\frac{\omega-1}{\omega}} + (1-a)^{\frac{1}{\omega}} \left(C_{Ft}^j\right)^{\frac{\omega-1}{\omega}} \right]^{\frac{\omega}{\omega-1}}, \quad \omega > 0.$$

- PPP holds for all t

- Equities, and not bonds, are traded across countries for international risk sharing and consumption smoothing purposes.

- Households pay quadratic financial intermediation costs to domestic financial intermediaries when they hold share positions that differ from zero.

- The budget constraint of home household j is:

$$
\begin{aligned}
& B_{t+1}^{j}+\int_{0}^{a} V_{t}^{z} x_{t+1}^{z,j} dz+\mathcal{E}_{t} \int_{a}^{1} V_{t}^{z^{*}} x_{t+1}^{z^{*},j} dz^{*}+ \\
& +\frac{\gamma_{x}}{2} \int_{0}^{a} V_{t}^{z}\left(x_{t+1}^{z,j}\right)^{2} dz+\mathcal{E}_{t} \frac{\gamma_{x^{*}}}{2} \int_{a}^{1} V_{t}^{z^{*}}\left(x_{t+1}^{z^{*},j}\right)^{2} dz^{*}+P_{t} C_{t}^{j} \\
= & \left(1+i_{t}\right) B_{t}^{j}+\int_{0}^{a}\left(V_{t}^{z}+D_{t}^{z}\right) x_{t}^{z,j} dz+\mathcal{E}_{t} \int_{a}^{1}\left(V_{t}^{z^{*}}+D_{t}^{z^{*}}\right) x_{t}^{z^{*},j} dz^{*} \\
& +W_{t}+P_{t} T_{t}^{j}+.
\end{aligned}
$$

- The following Euler equations hold for home household j:

$$
\left(C_{t}^{j}\right)^{-\frac{1}{\sigma}} V_{t}^{z}\left(1+\gamma_{x} x_{t+1}^{z,j}\right)=\beta E_{t}\left[\left(C_{t+1}^{j}\right)^{-\frac{1}{\sigma}}\left(V_{t+1}^{z}+D_{t+1}^{z}\right) \frac{P_{t}}{P_{t+1}}\right],
$$

$$
\left(C_{t}^{j}\right)^{-\frac{1}{\sigma}} V_{t}^{z^{*}}\left(1+\gamma_{x^{*}} x_{t+1}^{z^{*},j}\right)=\beta E_{t}\left[\left(C_{t+1}^{j}\right)^{-\frac{1}{\sigma}}\left(V_{t+1}^{z^{*}}+D_{t+1}^{z^{*}}\right) \frac{\mathcal{E}_{t+1}}{\mathcal{E}_{t}} \frac{P_{t}}{P_{t+1}}\right].
$$

- Home firm z produces output with the linear technology:

$$Y_t^{Sz} = Z_t L_t^z,$$

- Home firm z faces demand:

$$Y_t^{Dz} = (RP_t^z)^{-\theta} (RP_t)^{\theta-\omega} Y_t^W,$$

- Pricing:

$$RP_t^z = \frac{\theta}{\theta - 1} \frac{w_t}{Z_t},$$

- Labor demand

$$L_t^z = L_t = RP_t^{-\omega} \frac{Y_t^W}{Z_t}. \quad (1)$$

GDP, Relative Prices, and Income Distribution

$$TOT_t = \frac{p_t(z)}{\mathcal{E}_t p_t^*(z^*)} = \frac{P_{H,t}}{\mathcal{E}_t P_{F,t}^*} = \frac{RP_t}{RP_t^*} = \left(\frac{Z_t^*}{Z_t}\right)^{\frac{1}{\omega}}. \tag{2}$$

$$y_t \equiv RP_t Z_t \tag{3}$$

$$w_t = \frac{(\theta - 1) RP_t Z_t}{\theta} = \frac{(\theta - 1) y_t}{\theta}. \tag{4}$$

$$d_t = y_t - w_t = \frac{1}{\theta} w_t \tag{5}$$

Steady-State Portfolio and NFA

- Home equity holdings are:

$$x = \frac{\gamma_x^* \frac{a}{1-a}}{\gamma_x + \gamma_x^* \frac{a}{1-a}}, \quad \text{and } x^* = \frac{\gamma_{x^*}^*}{\gamma_{x^*} + \gamma_{x^*}^* \frac{a}{1-a}} \tag{6}$$

- Equity prices:

$$v = \frac{1}{\theta} \frac{\beta a}{a(1-\beta) + \gamma_x x}, \quad v^* = \frac{1}{\theta} \frac{\beta(1-a)}{(1-a)(1-\beta) + \gamma_{x^*} x^*}. \tag{7}$$

- Net foreign assets:

$$nfa \equiv v^* x^* - \frac{(1-a)}{a} v x_*$$

$$nfa = \frac{(1-a)}{\theta}\left[\frac{\gamma^*_{x^*}}{\Gamma_1} - \frac{\gamma_x}{\Gamma_2}\right] \tag{8}$$

$$\rightarrow \frac{(1-a)}{\theta}\left(\frac{1}{\gamma_{x^*}} - \frac{1}{\gamma^*_x}\right) \text{ for } \beta \rightarrow 1 \tag{9}$$

Valuation Changes and the Current Account

- Home aggregate per capita real net foreign assets entering period $t+1$ are:

$$nfa_{t+1} \equiv v_t^* x_{t+1}^* - v_t x_{*t+1}. \tag{10}$$

- Log-linearizing (10):

$$\widehat{nfa}_{t+1} = \left(\hat{v}_t^* - \hat{v}_t\right) + \left(\hat{x}_{t+1}^* - \hat{x}_{*t+1}\right), \tag{11}$$

with $\widehat{nfa}_{t+1} \equiv \mathrm{d}nfa_{t+1}/vx$ and $\hat{v}_t^* = \hat{V}_t^* - \hat{P}_t^* = \hat{V}_t^* - \left(\hat{P}_t - \widehat{\mathcal{E}}_t\right)$.

- The change in net foreign assets:

$$\widehat{nfa}_{t+1} - \widehat{nfa}_t =$$

$$= \left[\left(\hat{v}_t^* - \hat{v}_{t-1}^*\right) - (\hat{v}_t - \hat{v}_{t-1})\right] + \left[\left(\hat{x}_{t+1}^* - \hat{x}_t^*\right) - (\hat{x}_{*t+1} - \hat{x}_{*t})\right]$$

with

$$\left[\left(\hat{x}_{t+1}^* - \hat{x}_t^*\right) - (\hat{x}_{*t+1} - \hat{x}_{*t})\right] =$$

$$+\frac{d}{v}\left[\left(\hat{d}_t^* + \hat{x}_t^*\right) - \left(\hat{d}_t + \hat{x}_{*t}\right)\right] + 2\left(\frac{d}{v}\hat{d}_t + \frac{w}{v}\hat{w}_t - \frac{C}{v}\hat{C}_t\right).$$

Determinants of valuation change

- Valuation change (assuming $0 \leq \gamma < 1$, $\omega \geq 1$, $0 < \beta < 1$, $0 \leq \phi_Z < 1$, and AR1 for productivity process):

$$VA = [(\hat{v}_t^* - \hat{v}_t) - \left(\hat{v}_{t-1}^* - \hat{v}_{t-1}\right)] = -\left(\hat{v}_t^D - \hat{v}_{t-1}^D\right)$$

$$\left(\frac{1 - \beta + \gamma}{1 + \gamma - \beta\phi_Z}\right)\left(\frac{\omega - 1}{\omega}\right)\phi_Z\left(\hat{Z}_t^D - \hat{Z}_{t-1}^D\right). \tag{12}$$

- It has the sign of the productivity change

- It changes as follows:

$$\frac{\partial \eta_{v^D Z^D}}{\partial \phi_Z} = \left(\frac{\omega - 1}{\omega}\right) \frac{(1 - \beta + \gamma)(1 + \gamma)}{(1 + \gamma - \beta \phi_Z)^2} \geq 0,$$

$$\frac{\partial \eta_{v^D Z^D}}{\partial \omega} = \frac{(1 - \beta + \gamma)\,\phi_Z}{(1 + \gamma - \beta \phi_Z)\,\omega^2} \geq 0,$$

$$\frac{\partial \eta_{v^D Z^D}}{\partial \gamma} = \left(\frac{\omega - 1}{\omega}\right) \frac{\beta \phi_Z (1 - \phi_Z)}{(1 + \gamma - \beta \phi_Z)^2} \geq 0,$$

$$\frac{\partial \eta_{v^D Z^D}}{\partial \beta} = -\left(\frac{\omega - 1}{\omega}\right) \frac{\phi_Z (1 - \phi_Z)(1 + \gamma)}{(1 + \gamma - \beta \phi_Z)^2} \leq 0.$$

Determinants of valuation share in NFA dynamics

- Recall:

$$\widehat{nfa}_{t+1}-\widehat{nfa}_t=\left[\left(\hat{v}_t^* - \hat{v}_{t-1}^*\right)-\left(\hat{v}_t-\hat{v}_{t-1}\right)\right]+\left[\left(\hat{x}_{t+1}^*-\hat{x}_t^*\right)-\left(\hat{x}_{*t+1}-\hat{x}_{*t}\right)\right.$$

Hence:

$$\begin{aligned} 1 &= \frac{-\left(\hat{v}_t^D-\hat{v}_{t-1}^D\right)}{\widehat{nfa}_{t+1}-\widehat{nfa}_t}+\frac{\hat{x}_{t+1}^D-\hat{x}_t^D}{\widehat{nfa}_{t+1}-\widehat{nfa}_t} \\ &= VALShare_t + CAShare_t \end{aligned}$$

- The ratio $\left(\hat{x}_{t+1}^D-\hat{x}_t^D\right)/\left(\hat{v}_t^D-\hat{v}_{t-1}^D\right)$ is independent of ω.

- The effect of other parameters – specifically, the size of financial frictions, γ – needs to be evaluated numerically (increasing γ, increases valuation share, but of a smaller NFA change!)

Quantitative Analysis

- Fully symmetric, zero-NFA specification with standard assumptions on parameter values ($\beta = .99$, $\sigma = .5$, $\omega = 1.5$ $\theta = 6$, $\gamma = .01$), with some sensitivity analysis (NFA non-zero NFA or $\gamma = .1$).

- Shocks to productivity: temporary but persistent ($\phi_Z = .95$), country-specific, one standard deviation innovation.

Model evalaution: Table

Impact of higher gamma Table and Figures

Significance of higher gamma: Figures

Model implications

- NFA Dynamics can be affected significantly

- However, the direct impact of valuation channel on consumption allocations may not be large: the solution for $\hat{x}_{t+1}^D$ and $\hat{C}_t^D$ takes the form:

$$\begin{aligned} \hat{x}_{t+1}^D &= \eta_{x^D x^D}\hat{x}_t^D + \eta_{x^D Z^D}\hat{Z}_t^D, \quad (13) \\ \hat{C}_t^D &= \eta_{C^D x^D}\hat{x}_t^D + \eta_{C^D Z^D}\hat{Z}_t^D. \quad (14) \end{aligned}$$

- GE interpretation?

Model implications for optimal monetary policy

- Under assumptions of inelastic labor supply and linear production, firm-level monopoly power introduces no distortion in equilibrium output, but the flexible-price economy does not generate full consumption insurance.

- Sticky prices introduce an additional distortion as time-varying markups interfere with risk sharing for given monetary policy.

- Optimal monetary policy improves on the flexible-price allocation by inducing the markup path that is consistent with full consumption insurance.

- In contrast to models in which mimicking the flexible price allocation is optimal, the optimal response of monetary policy to productivity shocks is countercyclical.

Conclusions

- Ongoing financial integration has greatly increased gross foreign asset holdings, enhancing the scope for a "valuation channel" of external adjustment.

- We examine this channel of adjustment in a two-country DSGE model and find that:

  - Gross foreign asset holdings is necessary for the emergence of a valuation channel.

  - However, its magnitude increases with the degree of substitutability across goods, the size of financial frictions, and the persistence of shocks.

- Its quantitative importance in NFA dynamics is increasing in the degree of financial friction.

- It quantitative impact on consumption allocations, in a general equilibrium setting, still needs to be fully fleshed out.

- The analysis has novel implications for optimal monetary policy in open economy.