External Adjustment, Global Imbalances and Global Safe Assets

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2-External Adjustment

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Outline

Global Imbalances and Imperfect Enforcement

So far, models assumed that debts were perfectly enforced. Does imperfect enforcement change our conclusions?

- Imperfect enforcement of international debt is quite prevalent (sovereignty of borrower)
- Enforcement of domestic debt may be more prevalent. It is essentially a redistribution across different domestic agents
- BUT:
  - discrimination between domestic and international debt may be hard to implement
  - financial globalization may affect adversely the incentive to enforce debts (international AND domestic). Broner & Ventura (2016)
- Financial globalization changes the autarky interest rate.

The Conventional Model

- Overlapping generations, living 2 periods (young and old), with constant population.
- preferences: $\ln c_{t,t} + \beta \ln c_{t,t+1}$
- Technology: $y_t = k_t^\alpha$, full depreciation.
- The young work and earn $w_t = (1-\alpha)y_t$, save by accumulating capital k_{t+1}: $c_{t,t} + k_{t+1} = w_t$
- The old earn the return to capital αk_t^α.

Under Autarky

- with log preferences, the saving rate is: $s = \beta/(1+\beta)(1-\alpha)$
- Accumulation equation: $k_{t+1} = sk_t^\alpha$
- converge to: $k_{ss}^a = s^{1/(1-\alpha)}$
- autarky interest rate: $r_{ss}^a = \alpha/s - 1$
  (assume $\alpha \geq s$)

The Conventional Model

Under Financial Integration

- Country can save at gross rate $R^* = \alpha/s$ (no tilt in consumption)
- Enforcement is imperfect: with probability $1-\pi$, institutions fail and the country can decide not to repay international debt.
- International lenders require: $R = R^*/\pi$
- budget constraint: $c_{t,t} + k_{t+1} + b^*_{t+1}/R^* = w_t - b_{t+1}/R$
- $b < 0$ gross borrowing; $b^* > 0$ gross saving
- if country is capital abundant $(k_t > k^a_{ss})$
  - set $MP_k = \alpha k_{t+1}^{\alpha-1} = R^*$ i.e. $k_{t+1} = k^a_{ss}$ and save the rest abroad: $b^* = \alpha(k^\alpha - k^a_{ss}) > 0$.
- if country is capital scarce $(k_t < k^a_{ss})$
  - borrow $(b < 0)$ up to the point where

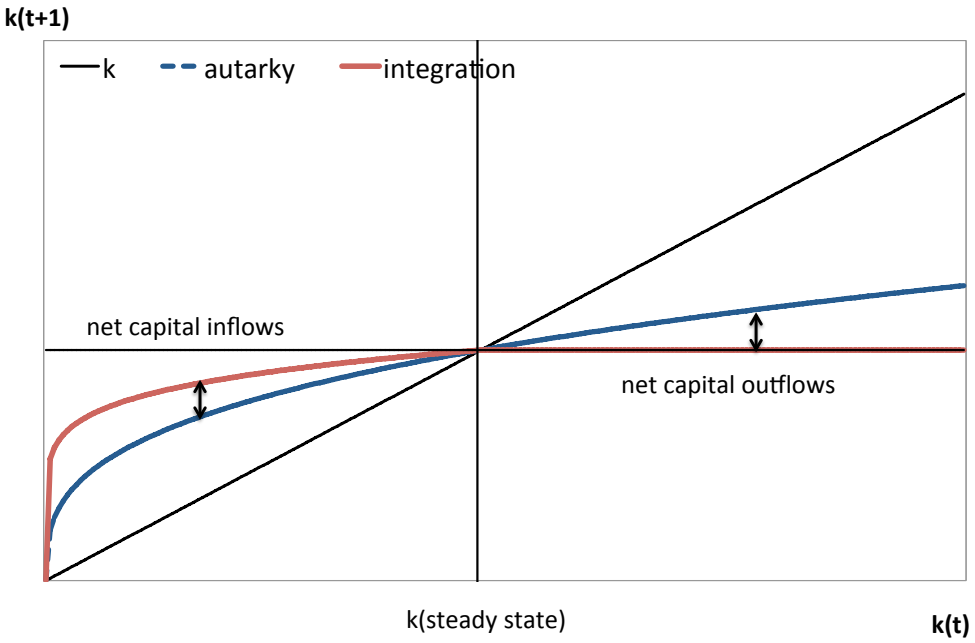
$$MP_k = \alpha k_{t+1}^{\alpha-1} = R^* - (1-\pi)b_{t+1}/k_{t+1} > R^*$$

  - last term reflects a risk premium on external borrowing
  - capital accumulation satisfies:

$$k_{t+1} = s\left(\pi k_{t+1}^{\alpha} + (1-\pi)k_t^{\alpha}\right)$$

- Steady state: $k = k^a_{ss}$, $b = 0$ and $1 + r = \alpha/s$
- Convergence is faster than under autarky, but not instantaneous.

Broner & Ventura (2016)



Laws of Motion under Conventional View; from Broner and Ventura (2016)

Imperfect Enforcement and Perfect Discrimination

Introduce heterogeneity within each generation.

- Two classes of agents: entrepreneurs (ϵ) and savers ($1-\epsilon$)
- Entrepreneurs can convert output into next period capital. Savers cannot.
- What happens if institutions fail?
  - Not enforcing debt contracts is a transfer from the savers to the entrepreneurs
  - Assume that the generation t chooses enforcement at $t+1$ to maximize: $c_{t,t+1} - \omega/2 \int |c_{it,t+1} - c_{t,t+1}|\, di$
- under autarky, this ensures that domestic debt is enforced, even if institutions fail, otherwise inequality would increase.
- under integration, if there is perfect discrimination between domestic and foreign debt, then it is always optimal to enforce domestic debt and to default on international debt when institutions fail.
- but discrimination is often difficult:
  - legal obstacles (*pari passu* clause)
  - creates an arbitrage opportunity: debt contracts are worth more in the hands of domestic agents.
- What happens if it is not possible to discriminate?

Imperfect Enforcement and No-discrimination

- Under Autarky: as before, it is preferable to enforce contracts.
- Under Financial Integration: a default (on both domestic and foreign debt) creates a trade-off.
  - Transfer from the rest of the world. Raises aggregate consumption.
  - Transfer from savers to entrepreneurs. Increases inequality

Optimistic Equilibrium.

- If the country is sufficiently capital abundant, there is an equilibrium where it is optimal to enforce (because there is no transfer from the rest of the world in case of default).
- Even if the country is capital scarce it is possible for the enforcement equilibrium to survive. Assume savers lend only to entrepreneurs:
  - under enforcement: $c^s_{t,t+1} = c^e_{t,t+1} = c_{t,t+1} = \alpha k_t^\alpha$
  - if there is a deviation: $c^s_{t,t+1} = 0;\ c^e_{t,t+1} = \alpha k_{ss}^\alpha/\epsilon;\ c_{t,t+1} = \alpha k_{ss}^\alpha$
  - enforcement is preferred iff: $k > k^a_{ss}(1-\omega(1-\epsilon))^{1/\alpha} = \underline{k} < k_{ss}$
- what supports the equilibrium: most borrowing is domestic.

Imperfect Enforcement and No-discrimination

Pessimistic Equilibrium

- There is another equilibrium where contracts are not enforced.
  - since domestic contracts are not enforced, domestic savers accumulate foreign assets and do not lend domestically
  - since there is no domestic lending, entrepreneurs borrow externally.
  - since domestic savers are not exposed to enforcement risk, default is optimal
  - but default risk means that there is a risk premium and the country can become a next exporter of capital, even if it is capital scarce under financial autarky.
- When $k <= \bar{k} = \epsilon^{-1/\alpha} k_{ss}^a$, entrepreneurs borrow up to the point where:

$$MP_k = \alpha k_{t+1}^{\alpha-1} = R^* - (1-\pi)\epsilon b_{t+1}/k_{t+1}$$

and

$$b_{t+1} = \left(sk^\alpha - k_{t+1}/\epsilon\right) R^*/\pi$$

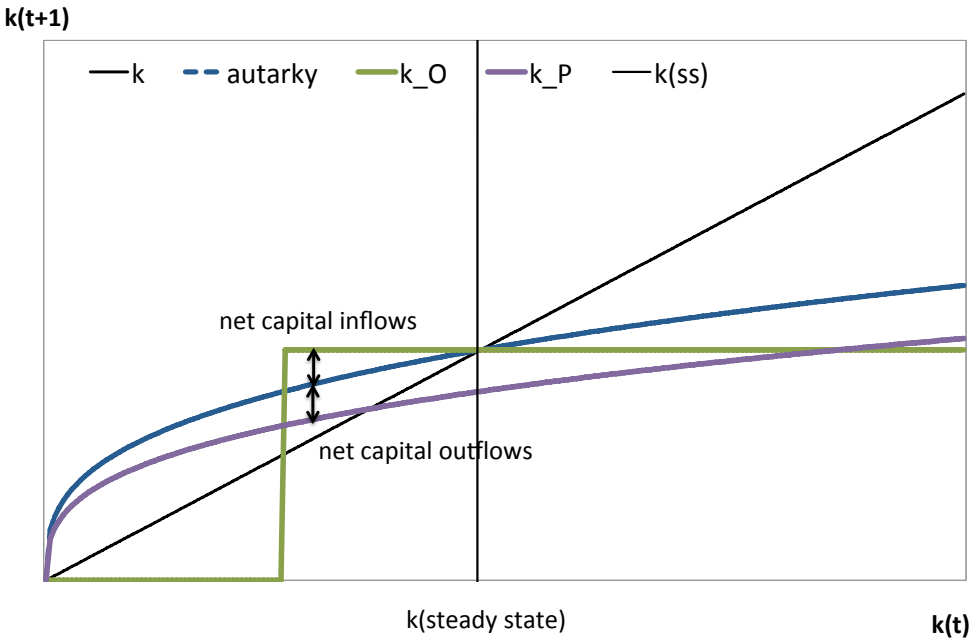
- Note that $\bar{k} > k_{ss}^a$ and that capital converges to

$$k_{ss}^P = k_{ss}^a \left(\pi + (1-\pi)\epsilon\right)^{1/(1-\alpha)} < k_{ss}^a$$

- Autarky interest rate along the pessimistic path:

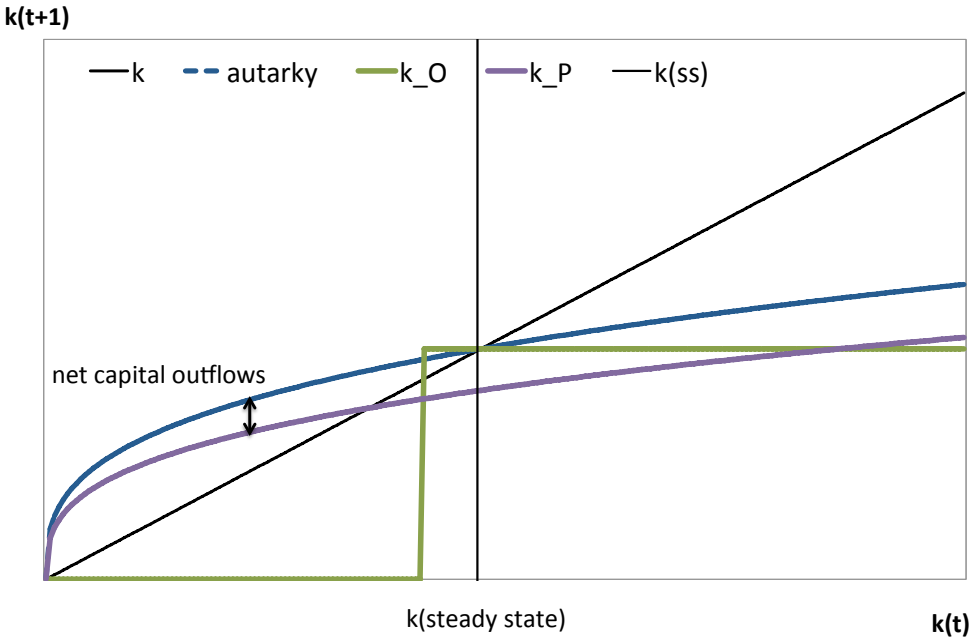
$$1 + r = MP_k = R^* \left(\pi + (1-\pi)\epsilon\right) < R^*$$

Imperfect Enforcement: Oscillations when $\underline{k} < k_{ss}^P$



Laws of Motion with Domestic Asset Trade and Non-Discrimination; from Broner and Ventura 2013. $\omega = 0.2, \epsilon = 0.1, \pi = 0.8$

Imperfect Enforcement: Low Output Trap when $\underline{k} > k_{ss}^{P}$



Laws of Motion with Domestic Asset Trade and Non-Discrimination; from Broner and Ventura 2013. $\omega = 0.05, \epsilon = 0.1, \pi = 0.8$

Imperfect Enforcement: Main Message

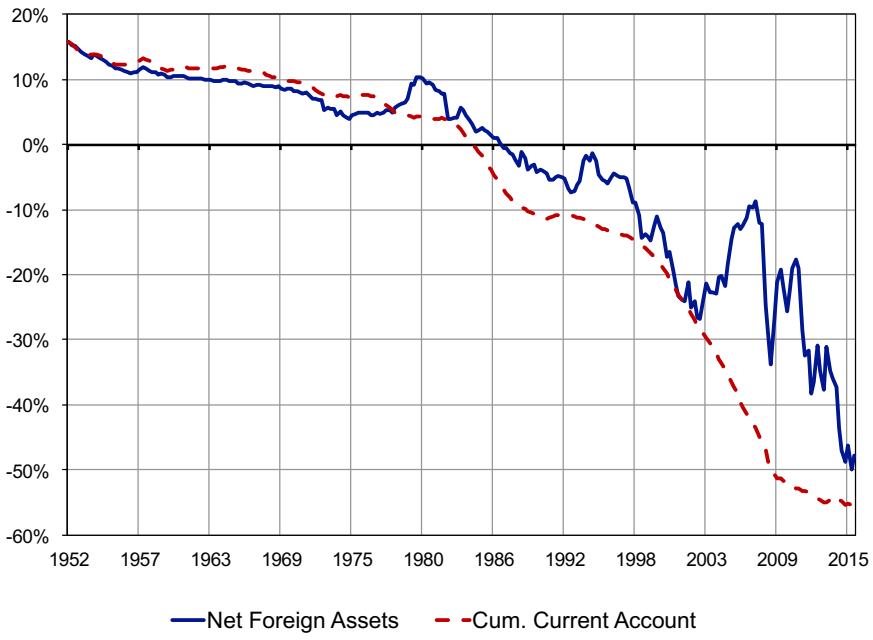
- Financial integration can make a country capital abundant (shift from the optimistic to the pessimistic path)
- The autarky interest rate (that determines the direction of capital flows) is endogenous to the financial account regime:
  - if it is closed, the country is capital scarce (high autarky interest rate)
  - if it is open, the country can be capital abundant (low autarky interest rate).
- Why? the risk premium for foreign borrowing is 'endogenous' & varies with the environment. Because in the pessimistic equilibrium savings invested domestically are low, this increases the risk premium which reduces the steady state capital stock.
- Countries can also oscillate between the optimistic and the pessimistic path: sudden waves of capital outflows. This can only happen for 'middle income' countries. The poorest countries are initially stuck in the pessimistic equilibrium

From net flows to gross flows

(Lane and Milesi Ferretti, Tille)

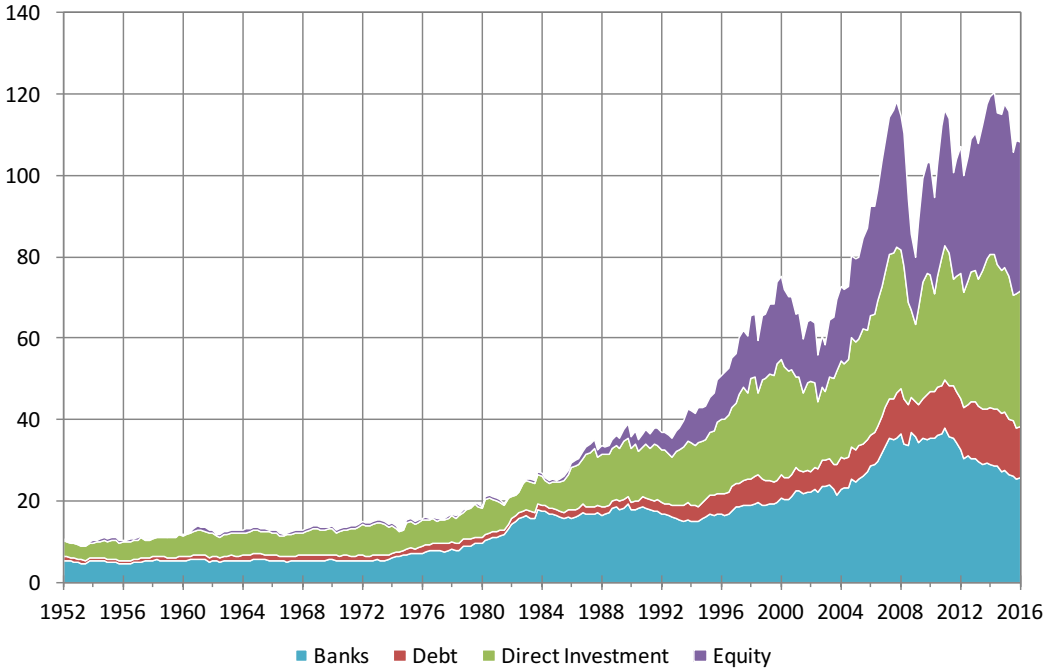
- Most of the models of global imbalances make predictions about net capital flows (intertemporal transfers across countries) not gross flows
- Financial globalization: cross-border financial positions, measured as the sum of gross foreign claims and liabilities over annual GDP, have risen from 68.4% in 1980 to 438.2% in 2007 for advanced economies.
- Heterogeneous composition of balance sheets

US Net Foreign Asset Position (percent of output)



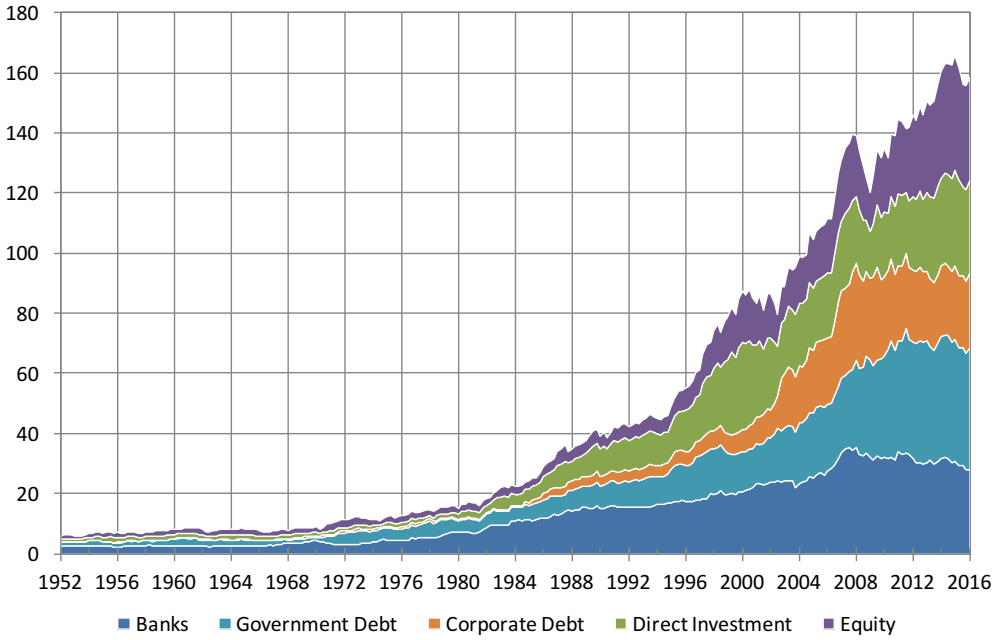
Source: BEA, SCB, 1941-43 Treasury Surveys. Gourinchas, & Rey (2016)

US Gross Asset Position (percent of output)



Source: BEA, SCB, 1941-43 Treasury Surveys. Gourinchas, Rey & Govillot (2016)

US Gross Liabilities Position (percent of output)



Source: BEA, SCB, 1941-43 Treasury Surveys.Gourinchas, Rey & Govillot (2016)

External solvency

- Net Foreign Assets $NA_t = A_t - L_t$
- Net Trade Balance $NX_t = X_t - M_t$

$$\begin{aligned} NA_t &= R_t NA_{t-1} + NX_t \\ NA_t &= NA_{t-1} + VA_t + CA_t \end{aligned}$$

Imposing a no-Ponzi condition and taking conditional expectations yields:

$$NA_t = -E_t \left[\sum_{i=1}^{+\infty} \left[\prod_{j=1}^{i} R_{t+j} \right]^{-1} NX_{t+i} \right].$$

In a world where only riskless bonds are traded

$$NA_t = -E_t \sum_{i=1}^{+\infty} (1+r)^{-i} NX_{t+i}$$

$$CA_t = Q_t - \hat{Q}_t = \sum_{s=t+1}^{\infty} (1+r)^{-(s-t)} E_t (Q_s - Q_{s-1})$$

International adjustment goes through *quantities*. (Obstfeld and Rogoff Handbook chapter)

From the intertemporal approach of the current account to valuation effects (Gourinchas & Rey (2007))

Loglinearizing around trends, imposing a no ponzi condition, we get a measure of *cyclical external imbalance* nxa_t (linear combinations of exports, imports, external assets and liabilities)

$$nxa_t \approx -E_t \sum_{j=1}^{+\infty} \rho^j \left[r_{t+j} + \Delta nx_{t+j} \right]$$

Movements in net exports and the net foreign asset position must forecast either future portfolio returns, or future net export growth, or both.

nxa: cyclical external imbalance. Embeds information about stocks (NA) and flows (NX).

- If $nxa < 0$ and if returns on net foreign assets are expected to be constant: $E_t r_{t+j} = r$. then any adjustment *must* come through future increases in net exports: $E_t \Delta nx_{t+j} > 0$. This is the *trade channel of adjustment*.

- Instead, the adjustment may also come from high *expected* net foreign portfolio returns: $E_t r_{t+j} > 0$. This is the *valuation channel of adjustment*.

Quantification of the trade channel of adjustment

$$\begin{aligned} nxa_t &= -\sum_{j=1}^{+\infty} \rho^j E_t r_{t+j} - \sum_{j=1}^{+\infty} \rho^j E_t \Delta nx_{t+j} \\ &\equiv nxa_t^r + nxa_t^{\Delta nx} \end{aligned}$$

The valuation channel has historically accounted for roughly 30% of the process of adjustment of the United States.

nxa_t^r and $nxa_t^{\Delta nx}$ are positively correlated

This is true whether one performs a conditional or an unconditional decomposition of the variance of external imbalances.

US world banker balance sheet and the exorbitant privilege

$$NA_{t+1} = R_{t+1} NA_t + NX_{t+1} + SD_{t+1} + OC_{t+1}$$

Gourinchas and Rey (2007, 2010), Curcuru et al. (2008a,b,2012), Lane and Milesi -Ferretti (2007, 2009), Obstfeld and Rogoff (2005), Forbes (2010)

	Period		
	1952:1-2011:4	1952:1-1972:4	1973:1-2011:4
Excess returns	$r^a - r^l$	$r^a - r^l$	$r^a - r^l$
(a) OC_{t+1}allocated to flows	1.6%	0.8%	2.0%
(b) OC_{t+1} same as (a) except FDI	2.1%	0.8%	2.8%
(c) OC_{t+1} allocated to valuations	2.7%	0.8%	3.8%

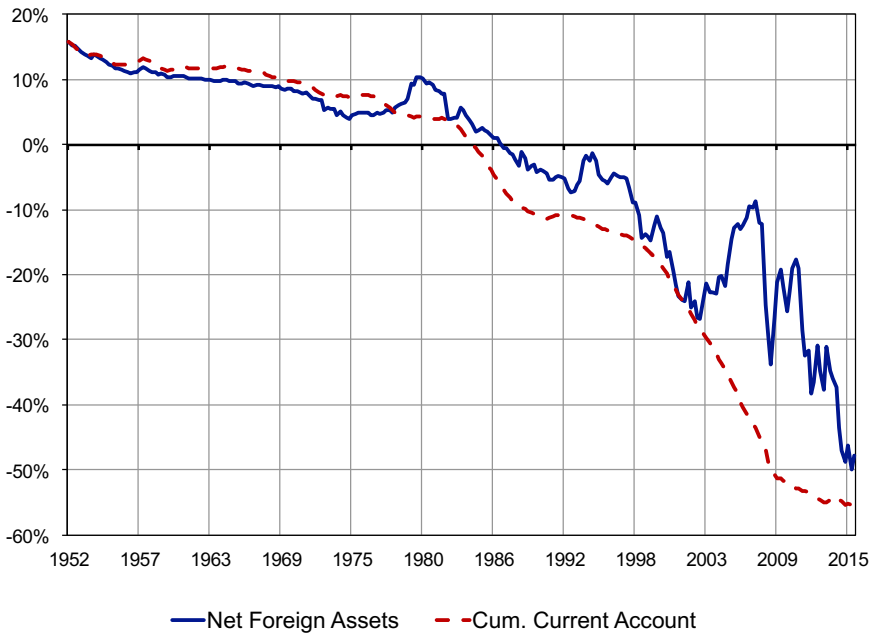
Table: Various Estimates of the Excess Returns on the U.S. Net Foreign Asset Position. Source: Gourinchas & Rey (2014)

Exorbitant Privilege and Exorbitant Duty

Based on Gourinchas, Rey & Govillot (2010)

- 'Exorbitant Privilege': excess return on external position. Does this excess return compensate for risk taking?
- 'Exorbitant Duty': large valuation on US external position at the peak of the global financial crisis.
  - Transfers wealth from the US to the rest of the world.
  - Precisely at times when the global global marginal utility of consumption is high.
- GGR propose a model of global risk sharing: US net provider of safe assets. Emphasizes the role of (a) economic size, (b) risk appetite, (c) fiscal capacity
- Maggiori (2013) proposes a similar model based on banking friction.

US Net Foreign Asset Position (percent of output)

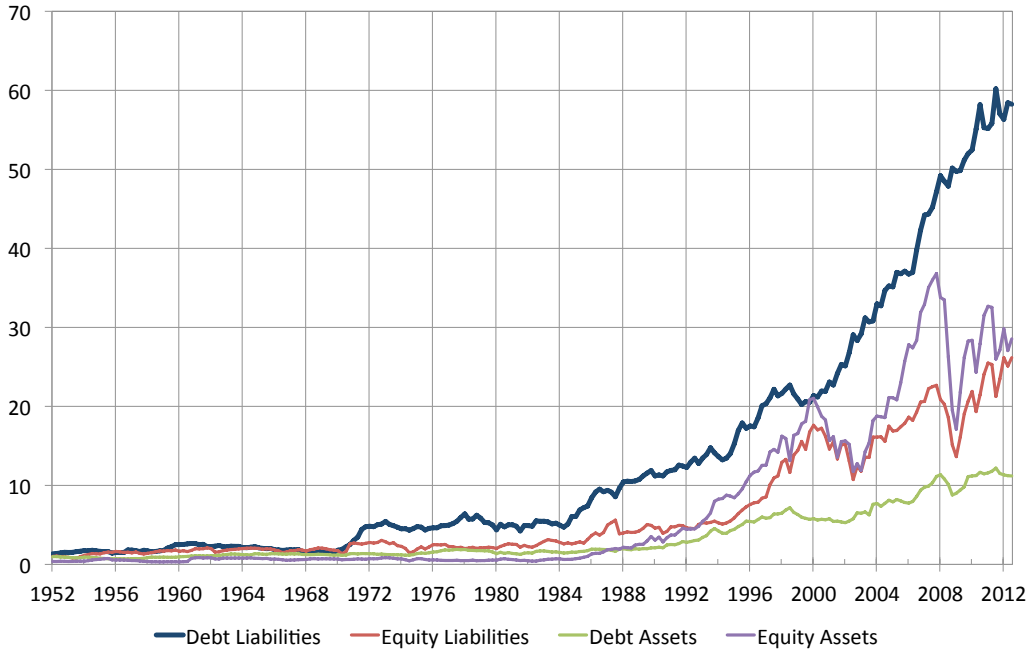


Source: BEA, SCB, 1941-43 Treasury Surveys. Gourinchas, & Rey (2016)

'Exorbitant Duty'

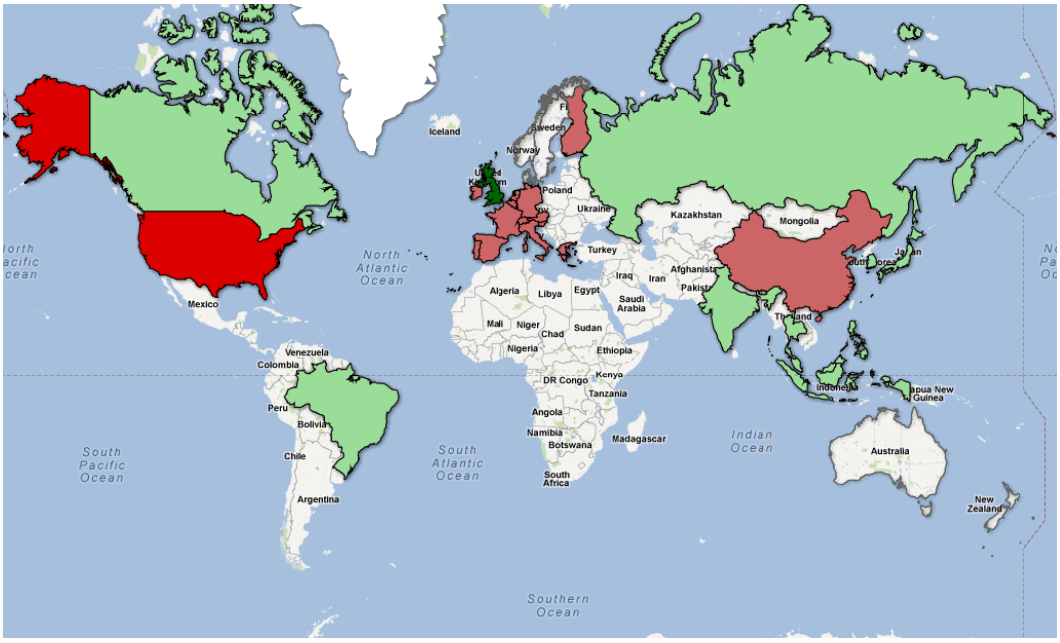
- During 2007-2009, US net foreign asset position deteriorated massively
  - Between 2007:4 and 2009:1, *NA* drops from USD -1.6tr to USD -4.29tr, a decline of USD 2.7tr
  - Over same period, cumulated current account represents -809bn,
  - Valuation loss of USD 1.9tr, or about 13.4% of US GDP,

U.S. External Debt and Equity, percent of US GDP



Source: BEA, SCB, 1941-43 Treasury Surveys. Gourinchas, Rey & Govillot (2013)

Heatmap of Gains and Losses on NIIP



The figure reports total valuation gains/losses. **Dark red**: losses in excess of $600bn. Light red: losses smaller than $600bn. Light green: gains smaller than $400bn. **Dark green**: gains in excess of $400bn. Source: from Gourinchas, Rey and Truempler (2012)

The Geography of Wealth Transfers, 2007-2008

	Val.	Equity			Dir. Inv.			Debt			Loans		
Country		Ass.	Liab.	Net	Ass.	Liab.	Net	Ass.	Liab.	Net	Ass.	Liab.	Net
U.S.	-863	-2,398	-1,245	-1,153	-161	-218	56	-120	-86	-34	149	-119	268
Euro	-185	-1,171	-1,677	506	-607	-273	-334	-461	-135	-326	-394	-363	-31
U.K.	542	-567	-851	284	-423	-337	-86	-176	-515	339	-332	-337	5
Japan	65	-244	-420	176	7	46	-39	-66	126	-193	419	298	121
Switz.	-53	-197	-220	23	28	77	-49	-45	-6	-39	13	2	11
Canada	17	-261	-189	-71	-78	-131	53	-24	-41	18	-7	-25	18
Oth. adv.	-3	-434	-401	-33	-221	-234	14	-135	-142	8	-101	-111	10
Brazil	292	-2	-207	205	7	-67	74	8	-15	23	-3	7	-9
India	20	0	-18	18	0	-24	24	-25	0	-24	-1	-3	3
Russia	317	-1	-209	208	-220	-350	130	-18	-18	0	-50	-29	-21
Em. Asia	245	-54	-246	192	-10	-67	57	-24	-8	-16	-35	-48	13
China	-158	1	13	-12	16	64	-48	-61	-2	-59	-22	17	-39
HK.	101	-258	-237	-21	-300	-421	122	7	2	5	-8	-4	-4
Sing.	-56	-80	-74	-5	-27	-22	-6	-31	0	-31	-15	0	-15
RoW	-282			-314			32			329			-329

Decomposition of the valuation change into a net equity, net direct investment, net debt and net bank loans components. Billion of US dollars. Source: Gourinchas, Rey and Truempler (2012)

Global Insurers/Liquidity Providers

- Global Liquidity Providers: U.S. (6%), Euro (1.36%), Switzerland (10.6%) and China (3.5% of GDP)
  - US (6% of GDP): losses on equity portfolio assets
  - Eurozone (1.36%) and Switzerland (10.6%): losses on direct investment and debt portfolio assets
  - China (3.5%): numbers are subject to more caution. Increase in DI liabilities and depreciation of Euro-denominated reserves assets.

- Global Liquidity Absorbers: other Emerging Market Economies (Russia, Emerging Asia, Brazil...); U.K.
  - Gains on equity liabilities
  - UK, additional gains on debt liabilities ($515 bn)

A Simple Model of Insurance Provision

- 2 countries, Home (US) and Foreign ($*$), equal size $1/2$.

- Endowment economy: y_t, y_t^*. Global output $\bar{y}_t$ iid.

- Representative household with CRRA preferences: $E_t \sum_{s=t}^{\infty} \beta^t c_t^{1-\sigma} / (1-\sigma)$,

- US has more tolerance for risk: $\sigma < \sigma^*$ (interpreted broadly as access to technology to reduce risk)

- Markets are complete.

A Simple Model

- Ex-ante symmetric equilibrium:

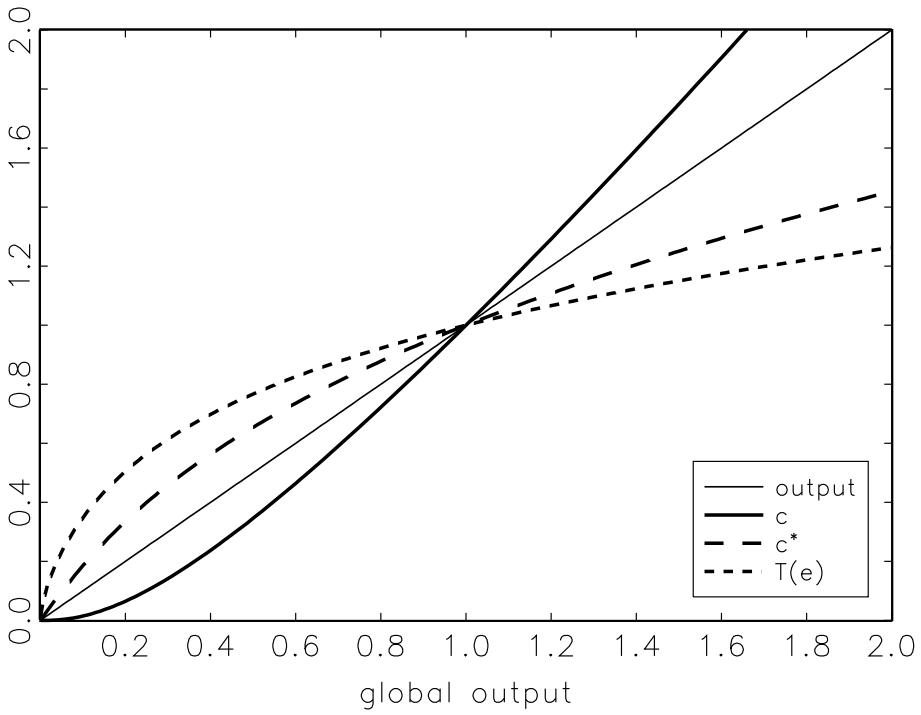
$$\frac{1}{2}\frac{c}{E\bar{y}} + \frac{1}{2}\left(\frac{c}{E\bar{y}}\right)^{\sigma/\sigma^*} = \frac{\bar{y}}{E\bar{y}}.$$

  US 'insures' foreign against bad times.
- Implements allocation with US equity holdings of $\sigma^*/(\sigma+\sigma^*) > 1/2$: leveraged external portfolio
- Autarky risk-free interest rate (w/output log-linearly distributed, variance σ_ϵ^2)

$$E \ln R_t^{aut} = -\ln\beta - \frac{\sigma^2}{2}\sigma_\epsilon^2.$$

  - lower autarky interest rate abroad since $\sigma^* > \sigma$ due to precautionary saving (Mendoza et al (2009); Caballero, Farhi & Gourinchas (2008))
- US runs trade deficit

Risk Sharing with Heterogenous Risk Aversion



The figure is drawn under the following assumptions: $E\bar{y} = 1$, $\sigma = 2$, $\sigma^* = 5$.

A Model of Global Disasters and Insurance

- Simple model is too stylized
  - single good, so no difference in risk-free returns
  - symmetric size
  - no episodes of global stress
- Richer model includes:
  - multiple goods (traded and non-traded)
  - differences in size (Hassan (2012))
  - global disaster risk (Barro (2006) and Rietz (1988))
  - differences in 'fiscal capacity' (size)

A Model of Global Disasters and Insurance

- 2 countries, Home (US) and Foreign ($*$), home size α.
- Endowment economy:
  - y_t^T, y_t^{*T} traded,
  - y_t^N, y_t^{*N} non traded.
  - Global output of traded good $\bar{y}_t^T = \alpha y^T + (1-\alpha) y^{*T}$.
- Representative household with CRRA preferences and $\sigma \leq \sigma^*$:

$$E_t \sum_{s=t}^{\infty} \beta^t c_t^{1-\sigma} / (1-\sigma),$$

- CES preferences over T and N consumption:

$$c = \left[\gamma^{1/\theta} \left(c^T\right)^{\frac{\theta-1}{\theta}} + (1-\gamma)^{1/\theta} \left(c^N\right)^{\frac{\theta-1}{\theta}} \right]^{\frac{\theta}{\theta-1}}$$

- Resource constraints: $c^N = y^N$ and $\alpha c^T + (1-\alpha) c^{*T} = \bar{y}^T$
- Markets are complete internationally.

Characterization

- with CM, marginal utility of consumptions proportional:

$$c_t^{(1/\theta-\sigma)}\left(c_t^T\right)^{-1/\theta}\kappa^{-1/\theta}=c_t^{*(1/\theta-\sigma^*)}\left(c_t^{*T}\right)^{-1/\theta},$$

- inter and intra-temporal elasticities of substitution:
  - $\sigma > 1/\theta$: T and N gross substitutes.
  - $\sigma < 1/\theta$: T and N gross complements
  - $\sigma = 1/\theta$: T and N separable
- price of domestic non-traded good:

$$q_t=\left(\frac{\gamma y_t^N}{(1-\gamma)\,c_t^T}\right)^{-1/\theta}$$

- common stochastic discount factor s.t. $E_t\left[M_{t,t+1}R_{t+1}\right]=1$

$$M_{t,t+1}=\beta\left(\frac{c_{t+1}}{c_t}\right)^{\frac{1}{\theta}-\sigma}\left(\frac{c_{t+1}^T}{c_t^T}\right)^{-1/\theta}$$

Business Cycles and Disasters

- Output Process:

$$\begin{aligned}\ln y_t^T &= \ln(\gamma)+\epsilon_t^T+v_t\\ \ln y_t^N &= \ln(1-\gamma)+\epsilon_t^N+v_t\end{aligned}$$

  - ϵ^i iid log-normal, sector & country specific;
  - v_t is a stationary Barro-Rietz process:
    - with probability p_d output falls by $(1-b)$ across sectors and countries.
    - with probability p_n output recovers
- Fiscal capacity: recovery rate r on government bonds may differ across countries during disasters: $r > r^*$.

Calibration

Parameters:

- γ: 0.25. Share of traded goods
- θ: 1 (el. of subst. b/w T and N)
- σ: 3 (so goods are gross substitutes)
- σ_ϵ^2: 0.02 (bus. cycle shocks)
- p_d: 1.17% cond. prob. of disaster (from Barro (2006))
- p_n: 2% cond. prob. of recovery
- b: 0.42 collapse in output in disaster (from Barro (2006))
- r^*: 0.75 foreign recovery rate

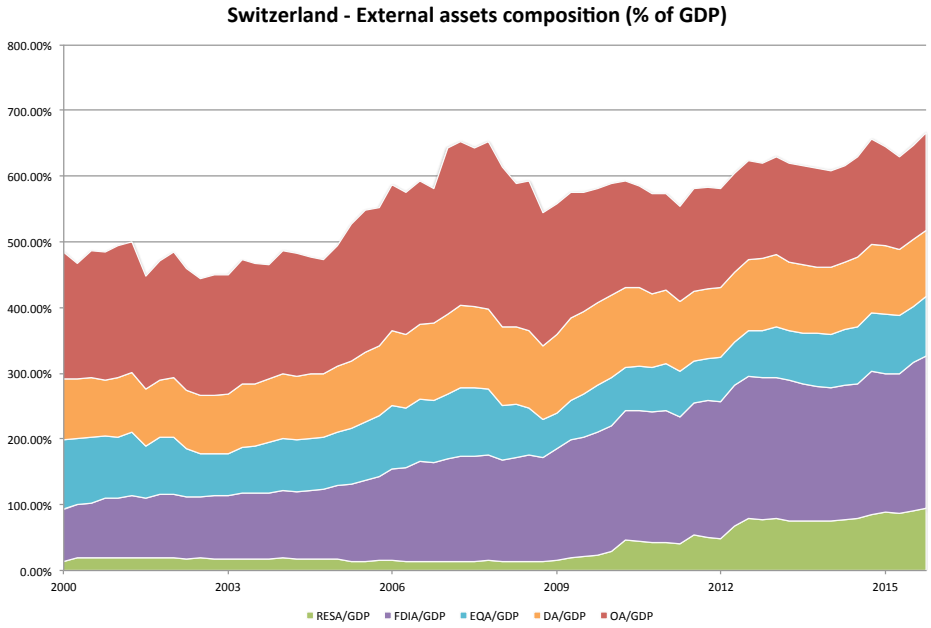
Model Simulation

Parameters		(1)	(2)	(3)	(4)
α		0.75	0.75	0.75	0.75
θ		1	1	1	1
σ^*		4	3	4	**4**
b			0.42	0.42	**0.42**
r^*			1	1	**0.75**
Equity Premium	(n.)	0.13	4.08	4.52	4.52
(percent)	(d.)				
T-bill excess return	(n.)	0.03	0.04	-1.87	0.34
(percent)	(d.)		0.04	-0.36	0.10
NA excess return	(n.)	0.00	0.00	0.15	0.15
(percent)	(d.)		0.00	0.17	0.17
Trade Balance	(n.)	0.00	0.00	-0.72	-0.72
(% of output)	(d.)		0.00	1.38	1.38
Net Foreign Assets	(n.)	0.00	0.00	0.00	0.00
(% of output)	(d.)		0.00	-14.48	-14.48
Net Debt Liabilities	(n.)	7.54	0.17	55.09	55.09
(% of output)	(d.)		0.28	86.33	86.33

Switzerland

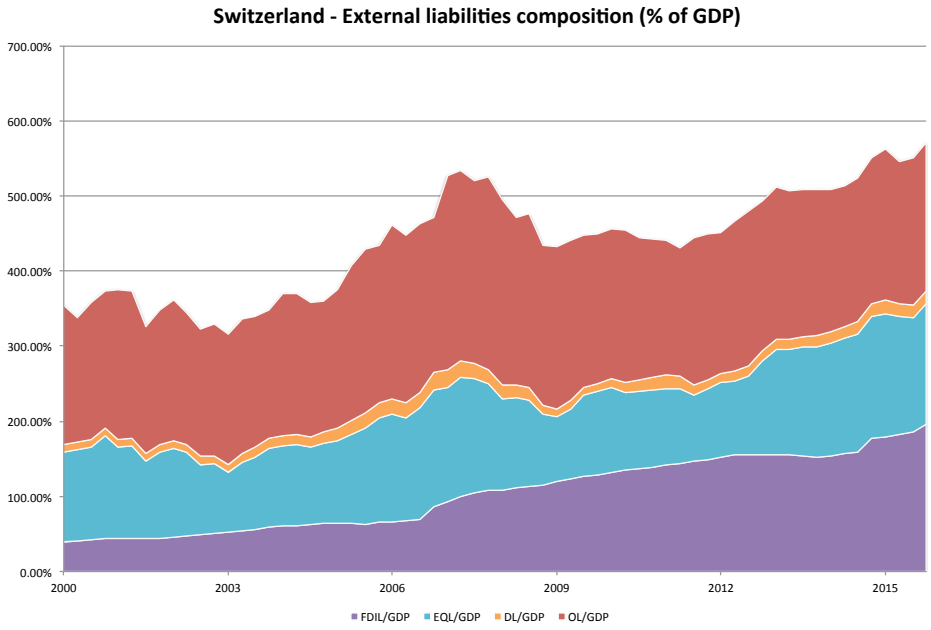
- Sets a floor at 1.2 Swiss Franc/Euros in January 2011
- January 2015: decides abruptly to let the CHF float

Switzerland: Gross External Assets (percent of Output)



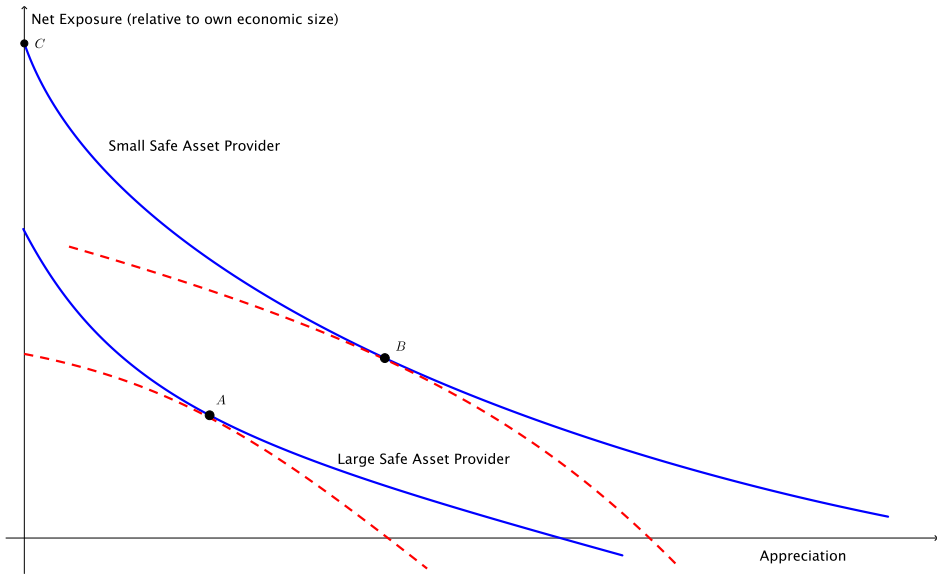
Note: The graph reports the gross external asset position of Switzerland as a % of GDP . RES: Reserves; FDI: Foreign Direct Investment; O: bank loan and trade credit; D: Portfolio Debt; EQ: Portfolio Equity. Source: Gourinchas, Rey & Govillot (2016).

Switzerland: Gross External Liabilities (percent of Output)



Note: The graph reports the gross external liability position of Switzerland as a % of GDP . RES: Reserves; FDI: Foreign Direct Investment; O: bank loan and trade credit; D: Portfolio Debt; EQ: Portfolio Equity. Source: Gourinchas, Rey & Govillot (2016).

The Curse of Regional Safe Asset Providers



The figure illustrates how the trade-off between net external exposure and real appreciation varies with size. A large safe asset provider chooses point A. A small safe asset provider chooses point B. If the currency is fixed, the country is at point C. Results based on Gourinchas, Rey & Govillot (2010).

Theoretical Models: Portfolio Balance

Down memory lane: Pentti Kouri's (1982) model.

- Time is continuous. There are 2 countries and 2 assets: riskfree bonds denominated in each currency, with instantaneous interest rates $r = r^* = 0$
- The supply of each asset is fixed and set to D and D^* respectively
- Domestic wealth is $W = D - B$ where B denotes net foreign liabilities (opposite of net foreign assets). $W^* = D^* + B/e$ where e is the nominal exchange rate.
- reduced form domestic asset demand: $D/W = \alpha_0 - \kappa E(\dot{e}/e)$.
  - $\alpha_0 > 0.5$: portfolio share in steady state. Home bias in portfolios.
  - κ: sensitivity of the asset demand to the excess return.
- Stock Equilibrium:

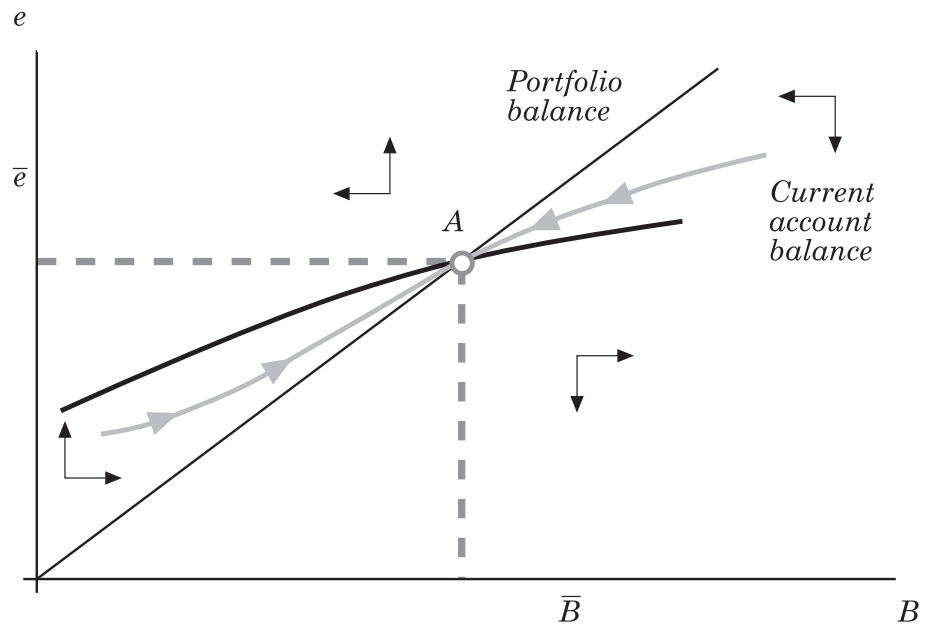
$$D = (\alpha_0 - \kappa E(\frac{\dot{e}}{e}))W + (1 - \alpha_0 - \kappa E(\frac{\dot{e}}{e}))eW^*$$

- Flow Equilibrium (balance of payments)

$$\dot{B} = -NX(e, W, W^*) - \frac{\dot{e}}{e}(1 - \alpha_0 + \kappa E(\frac{\dot{e}}{e}))W$$

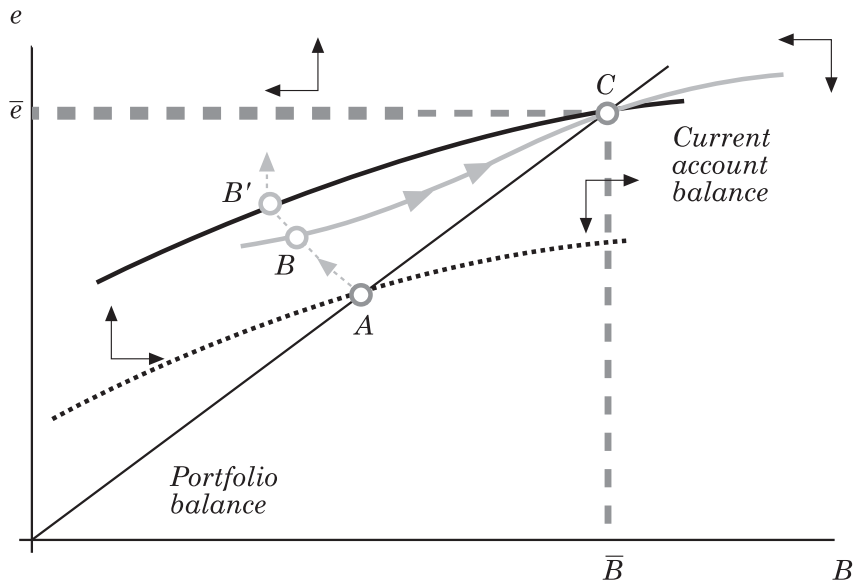
defines a dynamic system in (B, e)

Kouri's Portfolio Balance Model



Phase Diagram when Liabilities are in Domestic Currency. Slope is positive under home portfolio bias $\alpha_0 > 0.5$

An Adverse Shift in External Demand



Phase Diagram when Liabilities are in Domestic Currency

International Liquidity and Exchange Rate Dynamics

The insights of Kouri's model are captured neatly in Gabaix and Maggiori (2014)

- Combines Stock and Flow analysis as in Kouri (1982)
- Two period model preserves tractability; two-country endowment.
- Preferences: $\ln C_0 + \beta E[\ln C_1]$
- Consumption basket: $C = C_{NT}^{\chi_t} C_H^{a_t} C_F^{\iota_t}$
- Parametrize the problem to obtain a simple expression for exports and imports: $p_{F,t} C_{F,t} = \iota_t;\ p_{H,t} C_{H,t}^* = e_t \xi_t$
- e_t dollar price of Yen.
- under (trade) autarky: $e_t = \iota_t / \xi_t$
- households have access to a riskfree bond in terms of NT to smooth consumption. With log preferences, and given the assumption that the marginal utility of NT is always constant and equal to 1, we get: $R = R^* = \beta$

Financiers

- The key assumption of the paper is that international financial transactions have to be intermediated by intermediaries who have to be willing to bear the associated risk.
- As in Kouri, this generates a portfolio demand that is increasing in expected returns.
- GM 'assume' that the intermediaries's demand for domestic currency is (stock equilibrium):

$$Q = \frac{1}{\Gamma}\mathbb{E}[e_0 - e_1]$$

  where Γ captures 'risk aversion' ($\Gamma = 0$ implies UIP; $\Gamma = \infty$ means $Q = 0$)
- In this 'real' model, long the domestic currency means that the domestic economy runs a trade deficit. Balance of payment (flow equilibrium):

$$\begin{aligned} e_0\chi_0 - \iota_0 + Q_0 &= 0 \\ e_1\chi_1 - \iota_1 - RQ_0 &= 0 \end{aligned}$$

Solving the Model

- Assume $\beta = 1 = R$ and $\chi_t = 1$. Then $\sum e_t = \sum \iota_t$
- Substitute into stock equation:

$$\begin{aligned} e_0 &= \frac{(1+\Gamma)\iota_0 + \mathbb{E}\iota_1}{2+\Gamma} \\ e_1 &= \iota_1 - \mathbb{E}\iota_1 + \frac{\iota_0 + (1+\Gamma)\mathbb{E}\iota_1}{2+\Gamma} \\ \mathbb{E}\frac{e_1 - e_0}{e_0} &= \frac{\Gamma(\mathbb{E}\iota_1 - \iota_0)}{(1+\Gamma)\iota_0 + \mathbb{E}\iota_1} \\ NFA_0 &= \frac{\mathbb{E}\iota_1 - \iota_0}{2+\Gamma} \end{aligned}$$

- US has NFA if imports expected to grow: $\mathbb{E}\iota_1 > \iota_0$
- In that case, intermediaries need to be long the Yen and short the USD
- They will be willing to do this only if the Yen is expected to appreciate
- risk aversion Γ key parameter: $\partial e_0/\partial\Gamma = -NA_0/(2+\Gamma)$. Debtor countries depreciate when risk aversion increases.