Lecture 1 (Part 2): Current Accounts and Global Imbalances

PSE – APE Masters Year 1 (M1) – Macro 3

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Recap: three key results from Session 1

1. The current account is the saving–investment gap:

$$CA = S - I$$

An identity, not a theory.

2. CA deficits are financed by capital inflows; NIIP deteriorates:

- $\Delta NIIP = CA +$ valuation changes
- US: persistent deficits since 1982 $\Rightarrow$ net debtor since 1989 ($\approx -65\%$ GDP by 2020)

3. Global imbalances

- Emerging Asia surpluses + US deficits in the 2000s
- Competing explanations: savings glut, safe-asset demand, institutional quality

Session 2 roadmap

Three parts today:

Part A: Intertemporal theory

- Why do countries borrow and lend?
- The two-period small open economy model
- How the CA responds to temporary vs. anticipated income shocks

Part B: Twin deficits

- Adding a government to the model
- Ricardian equivalence: when a tax cut alone doesn't cause a CA deficit
- When does a fiscal expansion cause a CA deficit, and when doesn't it?

Part C: Empirical evidence $\Longrightarrow$ potential project papers

- Chinn and Prasad (2003): medium-term determinants of the CA
- Gruber and Kamin (2007): why the standard model fails in the 2000s

The Intertemporal Theory of the Current Account

Why do we need a model?

The accounting identities are silent on *why* saving is low or investment is high.

We need a model of household intertemporal choice: *why do people save now vs. consume now?*

The intertemporal approach (as per textbook, Schmitt-Grohé et al., 2022):

- The current account is the outcome of forward-looking saving decisions
- CA deficit reflects *consumption smoothing* or *investing in future growth*
- The key question: is the deficit temporary or structural?

We will use the simplest possible model (two-period, endowment, no investment) to derive the key insights today. Textbook has extension to production economy in Ch 5.

The small open economy

Most countries are *small open economies* (SOEs): they cannot influence world prices or interest rates.

"Small": world prices and the world interest rate r^* are independent of domestic conditions.

"Open": the country trades freely in goods and financial assets.

Examples: Netherlands, Chile, South Korea, Denmark — and arguably France.

Large open economies (US, China, euro area) affect world prices $\Rightarrow$ a richer but harder model. We set those aside.

Key implication of SOE: free capital mobility pins the domestic interest rate at the world rate: $r = r^*$.

Model: the two-period endowment SOE

A stripped-down model to isolate the intertemporal logic.

Timing and endowments:

- Two periods: period 1 (today), period 2 (tomorrow)
- Households receive endowments Q_1 and Q_2 (perishable — cannot be stored)
- Initial net foreign asset position: B_0 (can be negative, i.e., an inherited debt)

Choices:

- In period 1: choose C_1 and B_1 (bonds held entering period 2)
- In period 2: choose C_2, using all remaining wealth ($B_2 = 0$ since final period)

No investment, no government (for now). We add a government later.

The intertemporal budget constraint

Period-by-period budget constraints:

$$\text{Period 1:} \quad C_1 + B_1 = (1 + r_0)B_0 + Q_1, \qquad \text{Period 2:} \quad C_2 = (1 + r^*)B_1 + Q_2$$

Combining (substitute out B_1):

$$C_1 + \frac{C_2}{1 + r^*} = \underbrace{(1 + r_0)B_0 + Q_1 + \frac{Q_2}{1 + r^*}}_{\bar{Y} = \text{lifetime wealth}} \tag{1}$$

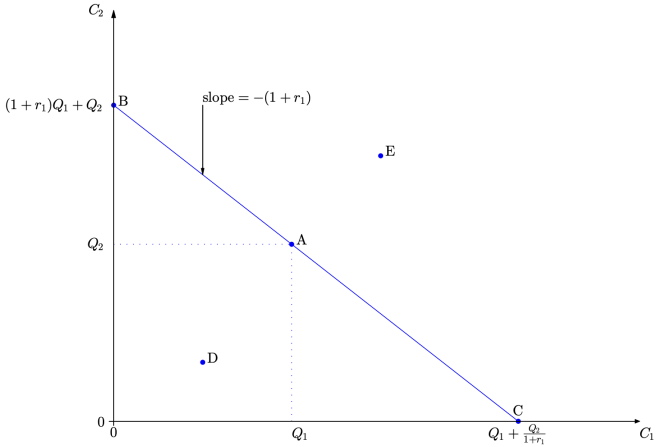
$\bar{Y}$ is lifetime wealth: initial financial wealth plus the present value of all endowments.

The trade balance and current account in period 1 are:

$$TB_1 = Q_1 - C_1, \qquad CA_1 = TB_1 + r_0 B_0$$

- If $C_1 > Q_1 \Rightarrow TB_1 < 0 \Rightarrow$ trade deficit (borrowing from abroad)
- Since $B_1 = B_0 + CA_1$, if $CA_1 < 0 \Rightarrow B_1 < B_0 \Rightarrow$ NIIP deteriorates

The intertemporal budget constraint



Notes. The downward-sloping line represents the consumption paths (C_1, C_2) that satisfy the intertemporal budget constraint (4). The figure is drawn under the assumption that the household's initial asset position is zero, $B_0 = 0$.

Implication: Country's problem is a standard consumption-saving problem, where the lender/borrower is the rest of the world. PDV of C = PDV of income

Preferences and the Euler equation

Households maximise lifetime utility:

$$\max \; U(C_1) + \beta\, U(C_2)$$

where $\beta \in (0, 1]$ is the subjective discount factor.

Optimality condition (tangency of indifference curve with IBC):

$$U'(C_1) \;=\; \beta(1 + r^*)\, U'(C_2) \tag{2}$$

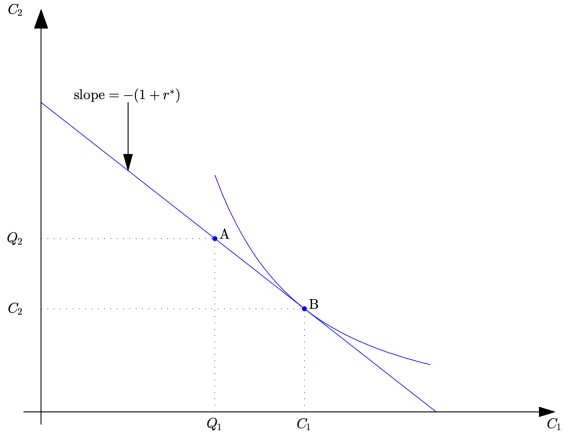
Interpretation: the marginal utility of consuming \$1 today equals the (discounted) marginal utility of the $1 + r^*$ units it generates if saved.

Special case – log utility and $\beta = 1$:

$$\frac{1}{C_1} = (1 + r^*)\frac{1}{C_2} \quad \Rightarrow \quad C_2 = (1 + r^*)\, C_1$$

Substituting into (1): $C_1^* = \frac{1}{2}\,\bar{Y}$ (spend half of lifetime wealth in period 1)

Equilibrium: optimal consumption and trade balance



Notes: The figure displays the equilibrium in a small open economy with free capital mobility and a zero initial net foreign asset position, $B_0 = 0$. The equilibrium is at point B, where an indifference curve is tangent to the intertemporal budget constraint. Because of free capital mobility, the domestic interest rate is equal to the world interest rate, r^*, so that the slope of the intertemporal resource constraint is $-(1+r^*)$. As the figure is drawn, the country runs trade and current account deficits in period 1, $C_1 > Q_1$.

Shock 1: Temporary fall in output (analytical)

Suppose Q_1 falls by Δ but Q_2 is unchanged.

Effect on lifetime wealth: $\bar{Y}' = \bar{Y} - \Delta$ (wealth falls by exactly Δ, not 2Δ).

Optimal response (in our log utility special case):

$$C_1' = \tfrac{1}{2}\bar{Y}' = C_1 - \tfrac{1}{2}\Delta \quad \Rightarrow \quad C_1 \text{ falls by only } \tfrac{1}{2}\Delta$$

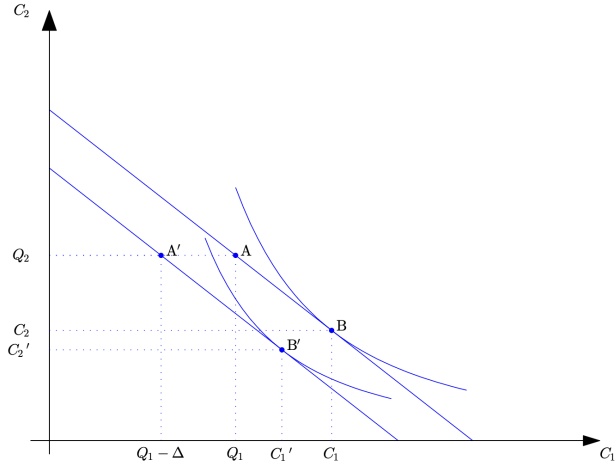
Current account:

$$\Delta CA_1 = \Delta TB_1 = \Delta Q_1 - \Delta C_1 = -\Delta + \tfrac{1}{2}\Delta = -\tfrac{1}{2}\Delta < 0$$

Interpretation: the household *smooths consumption* — borrows to offset half the temporary income loss; repays in period 2 by consuming less.

Contrast with autarky: in a closed economy, C_1 must fall by the full Δ. International borrowing provides *insurance and consumption smoothing*.

Shock 1: Temporary fall in output (graphical)



Notes: The figure depicts the adjustment of the economy to a decline in the period 1 endowment equal to Δ. The endowment point shifts left from point A to point A′ and the optimal consumption path shifts from point B to point B′. Period 1 consumption declines by less than Δ. The period 1 trade balance becomes more negative, $Q_1 - \Delta - C_1' < Q_1 - C_1$. The figure is drawn under the assumption that the household's initial asset position is zero, $B_0 = 0$.

Shock 2: Permanent output shock (analytical)

Suppose both Q_1 and Q_2 fall by Δ (a permanent shock).

Lifetime wealth falls by:

$$\Delta \bar{Y} = -\Delta - \frac{\Delta}{1+r^*} = -\Delta \cdot \frac{2+r^*}{1+r^*}$$

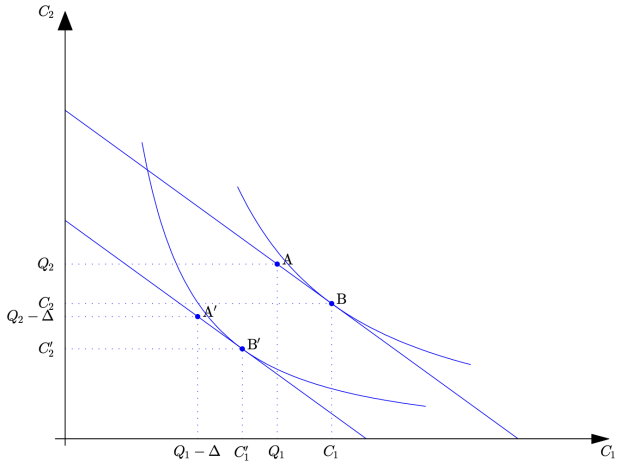
Special case – log utility and $\beta = 1$: $\Delta C_1 = \frac{1}{2}\Delta \bar{Y} = -\frac{\Delta(2+r^*)}{2(1+r^*)}$

Current account change:

$$\Delta CA_1 = \Delta Q_1 - \Delta C_1 = -\Delta + \frac{\Delta(2+r^*)}{2(1+r^*)} = -\frac{r^* \Delta}{2(1+r^*)} \approx 0$$

For small r^*, the CA barely moves. The household reduces consumption by nearly all the permanent income loss in *both* periods — no need to borrow or lend internationally.

Shock 2: Permanent output shock (graphical)



Notes: The figure depicts the adjustment to a decline in Q_1 and Q_2 equal to Δ. The endowment point A shifts down and to the left to point A′. The intertemporal budget constraint shifts down in a parallel fashion. The optimal consumption path (C_1, C_2) shifts from point B to point B′. The figure is drawn for the case $B_0 = 0$. The period 1 trade balance is little changed.

Shock 3: Anticipated increase in future output (analytical)

Suppose Q_2 rises by Δ but Q_1 is unchanged.

Effect on lifetime wealth: $\bar{Y}' = \bar{Y} + \dfrac{\Delta}{1+r^*}$ (household feels richer today).

Optimal response (in our log utility special case):

$$C_1' = \tfrac{1}{2}\bar{Y}' = C_1 + \tfrac{\Delta}{2(1+r^*)} \quad \Rightarrow \quad C_1 \text{ rises even though } Q_1 \text{ is unchanged}$$

Current account:

$$\Delta CA_1 = \Delta Q_1 - \Delta C_1 = 0 - \tfrac{\Delta}{2(1+r^*)} = -\tfrac{\Delta}{2(1+r^*)} < 0$$

Interpretation: good news about the future causes a CA *deficit* today — the household borrows against future income.

Example: Ireland and Portugal in the late 1990s after joining the eurozone — optimistic growth expectations generated large CA deficits. Theory said this was optimal.

The general principle: finance vs. adjust

The three shocks illustrate a fundamental principle of the intertemporal approach:

Shock type	CA response	Consumption response
Temporary $-$ (Q_1 only)	Large ($-\frac{1}{2}\Delta$)	Small ($-\frac{1}{2}\Delta$)
Permanent $-$ (Q_1 and Q_2)	Small (≈ 0)	Large ($\approx -\Delta$)
Anticipated future $+$ (Q_2 only)	Large ($-\frac{\Delta}{2(1+r^*)}$)	Small ($+\frac{\Delta}{2(1+r^*)}$)

Finance temporary shocks by borrowing/lending on international markets. The CA moves a lot; consumption changes little.

Adjust to permanent shocks by changing spending in both periods. The CA moves very little.

The punch line: If you lose your lunch money one day, borrow from a friend and repay next time. But if your allowance is cut permanently, you must reduce spending.

(Schmitt-Grohé, Uribe & Woodford 2022, Ch. 3)

Twin Deficits

Incorporating a government

Add a government that spends, taxes, and can borrow.

Government budget constraint (each period):

$$G_t + B_t^g - B_{t-1}^g = T_t + r_{t-1} B_{t-1}^g$$

Government IBC (final period: $B_2^g = 0$):

$$G_1 + \frac{G_2}{1+r^*} = (1+r_0) B_0^g + T_1 + \frac{T_2}{1+r^*} \tag{3}$$

Household disposable income: $Q_1 - T_1$ in period 1; $Q_2 - T_2$ in period 2.

Any combination of (T_1, T_2) satisfying (3) is feasible. The key question: does the *timing* of taxes matter for the economy?

Note: In this basic model, there are no frictions (financial constraints, ...) so we will get strong and not fully realistic Ricardian Equivalence results here.

Ricardian equivalence: tax timing irrelevance

For log utility and $\beta = 1$ special case, substitute the government IBC (3) into the household consumption function. Taxes cancel out, leaving:

$$C_1^* = \frac{1}{2}\left[(1+r_0)B_0 + Q_1 - G_1 + \frac{Q_2 - G_2}{1+r^*}\right] \tag{4}$$

Key result: neither T_1 nor T_2 appear in C_1^* — only government *spending* (G_1, G_2) matters.

Ricardian equivalence (Barro, 1974):

A debt-financed tax cut has no effect on consumption or the current account.

- Tax cut in period 1 $\Rightarrow$ government saving falls by ΔT_1
- Rational households anticipate higher future taxes $\Rightarrow$ private saving rises by ΔT_1
- National saving unchanged $\Rightarrow$ CA unchanged
- (holds generally, not just in this analytical special case)

For the full derivation, see Schmitt-Grohé et al. (2022) Ch. 8 or ‣ Appendix: RE derivation.

Twin deficits: $\uparrow G_1 \implies \downarrow CA_1$

Temporary increase in G_1 (with G_2 unchanged):

From (4): $\Delta C_1 = -\frac{1}{2}\Delta G_1$

$$\Delta CA_1 = \underbrace{\Delta TB_1}_{\Delta Q_1 - \Delta C_1 - \Delta G_1} = 0 - \left(-\frac{1}{2}\Delta G_1\right) - \Delta G_1 = -\frac{1}{2}\Delta G_1 < 0$$

If the government doesn't raise taxes immediately $\Rightarrow$ fiscal deficit *and* CA deficit: **twin deficits**.

Note: the CA deteriorates by only *half* the increase in spending. Households feel poorer (anticipate future $\uparrow$ tax) and cut consumption — partially offsetting the government

Permanent increase in G**:** effect on CA is very small ($\approx -\frac{r^*}{2(1+r^*)}\Delta G$) — the permanent income logic again.

Why Ricardian equivalence breaks down in practice

Three reasons why the tax-cut neutrality result fails empirically:

1. Borrowing constraints

- Liquidity-constrained households spend the whole tax cut (MPC = 1, not 0)
- Tax cut boosts current consumption $\Rightarrow$ CA deteriorates
- I.e. in richer model, tax cuts also cause Twin deficits

2. Intergenerational effects (OLG)

- Those receiving the tax cut today are *not* the same people who will face higher taxes tomorrow
- Current generation consumes more; future generations bear the burden

3. Distortionary taxes

- A VAT cut changes the relative price of consumption now vs. later $\Rightarrow$ intertemporal substitution $\Longrightarrow$ consumption can change even if lifetime wealth is unchanged

Project papers for this lecture

Chinn and Prasad (2003)

From theory to regression: what determines the CA?

The intertemporal model gives us structural candidates for what drives the CA:

- **Initial NFA position:** countries with initial liabilities must eventually run surpluses
- **Fiscal balance:** government saving $\Rightarrow$ national saving $\Rightarrow$ CA (twin deficits)
- **Income and development:** richer or faster-growing countries may attract or repel capital
- **Demographics:** dependency ratios affect aggregate saving
- **Openness and financial depth:** structural features that affect investment attractiveness

Chinn and Prasad (2003) take these to the data using cross-section and panel regressions

Regression framework:

$$\left(\frac{CA}{GDP}\right)_{i,t} = \alpha + \beta X_{i,t} + \varepsilon_{i,t}$$

where X includes NFA/GDP, fiscal balance/GDP, relative income, growth, dependency ratios, trade openness, financial depth, terms-of-trade volatility, ...

Data and methodology

Sample: 18 industrial + 71 developing countries; annual data 1971–1995.

Key methodological choices:

- **5-year non-overlapping averages** (1971–75, …, 1991–95)
  - Reduces measurement error (especially important for developing countries)
  - Focuses on medium-run structural determinants, not business cycle variation
- **No country fixed effects** — deliberately, since ∼40% of CA variation is cross-sectional; FE would sweep away the cross-country patterns of interest
- **Time dummies included** in all panel regressions to capture global capital-flow cycles (e.g. Latin debt crisis, 1990s emerging market flows)
- **Separate regressions for industrial and developing countries** — coefficients differ significantly across groups (formally tested)
- **Oil-exporter dummy** included in panel regressions (positive, significant)
- **Correlation not causation!** How to interpret?

Panel results: headline findings

Variable	Industrial	Developing
Initial NFA/GDP	$+0.10$ to $+0.15$	$+0.05$ to $+0.10$
Fiscal balance/GDP	small / insig.	$\approx +0.40$
Old-age dependency	-0.08 to -0.15	neg., less robust
Youth dependency	not significant	neg., sig. (excl. Africa)
Trade openness	not significant	neg., sig. (excl. Africa)
Financial depth	n/a	pos., significant
ToT volatility	not significant	pos., sig. (excl. Africa)
GDP growth	pos., significant	mixed / insig.
Capital controls	not significant	not significant

Note: Panel OLS with time dummies and oil-exporter dummy. $\bar{R}^2 \approx 0.44$ (developing countries).

Fiscal balance: partial Ricardian offset

Headline result for developing countries (panel): A 1 percentage point improvement in the government budget balance $\Rightarrow \approx 0.40$ **pp** improvement in the CA/GDP ratio.

Interpretation: This is consistent with a *partial but incomplete Ricardian offset*.

- RE is specifically about **tax timing**: a debt-financed tax cut should leave CA unchanged because households save the windfall to pay future taxes $\Rightarrow$ **coefficient** $= 0$ for pure tax changes under full RE
- For **spending changes**, even full RE predicts $\beta > 0$: a temporary spending cut raises lifetime wealth, but households smooth it over many periods, so consumption rises only slightly and most of the improvement flows into the CA
- **No offset at all** (hand-to-mouth households): coefficient $= 1$ (CA moves one-for-one with fiscal balance regardless of source)
- Coefficient $\approx 0.40 \Rightarrow \approx$ 60% average offset — consistent with significant but incomplete Ricardian behaviour for taxes, or a mix of tax- and spending-driven changes

For industrial countries: coefficient is near zero and statistically insignificant in the panel

Initial NFA: a positive coefficient — and why

Theory predicts: countries with large net foreign liabilities must eventually run surpluses $\Rightarrow$ *negative* coefficient on NFA/GDP.

Finding: coefficient is *positive* — countries with larger NFA run *larger* CA surpluses.

Why? Two mechanisms at work:

- **Investment income effect:** creditor countries earn interest on their NFA $\Rightarrow$ positive effect on CA (investment income $\in$ CA). This mechanically generates a positive coefficient.
- **Capital market selection:** among *developing* countries, those with large net foreign liabilities tend to be *the most attractive* for capital (high productivity, good access) — they can keep running deficits despite accumulated liabilities.

Caveat for industrial countries: Japan and Switzerland (large NFA, large surpluses) drive the cross-section result. The *US* — a large net debtor running persistent deficits — is the main outlier; the positive NFA–CA link does *not* hold for it.

Stages of development: the hypothesis and the evidence

The stages-of-development hypothesis:

- Early-stage countries import capital $\Rightarrow$ run CA deficits
- Late-stage countries export capital $\Rightarrow$ run CA surpluses
- Prediction: *U-shaped* relationship between relative income and CA (negative coefficient on relative income, positive on its square)

Evidence — cross-section:
The opposite pattern appears (positive on level, negative on square), driven by industrial vs. developing country clusters. **Not supported.**

Evidence — panel (developing countries):
Negative coefficient on relative income + positive coefficient on square $\Rightarrow$ **weakly consistent** with the hypothesis. But only the quadratic term is significant.

Evidence — panel with fixed effects:
Stronger support emerges: FE specifications yield significant coefficients consistent with the hypothesis for developing countries.

Bottom line: mixed and fragile support

Growth and openness: heterogeneous effects

GDP growth:

- **Full sample / developing countries:** no clear relationship (or negative in some specs)
- **Industrial countries:** strong *positive* relationship — high-growth rich countries tend to run surpluses and export capital
- **Interpretation:** in advanced economies, high growth reflects productivity gains and generates saving; in developing economies, high growth attracts capital inflows, financing deficits

Trade openness:

- **Industrial countries:** *no significant* relationship
- **Developing countries (excl. Africa):** negative and significant
- **Mechanism:** more open developing economies are more attractive for foreign capital (better FX earnings, technology transfer, debt-service capacity) $\Rightarrow$ more capital inflows $\Rightarrow$ larger CA deficits
- Result is driven by developing countries only

Cross-section vs. panel: why the distinction matters

The paper runs **two distinct exercises**:

	Cross-section	**Panel (5-yr averages)**
Variation used	Across countries only	Across countries *and* over time
Time horizon	Very long run (1971–1995 avg)	Medium run (each 5-yr period)
Initial NFA result	Positive mainly for *industrial*	Positive for *developing* as well
Fiscal balance result	Positive, significant everywhere	Insignificant for *industrial*
Stages of development	Not supported	Weak support (dev. countries)

Why do they differ? In the cross-section, NFA captures permanent country-level wealth differences. In the panel, within-country variation of NFA picks up countries that accumulate external liabilities while *remaining* attractive for capital (high-productivity developing countries).

Important for replication: you will get different coefficient estimates depending on whether you run cross-section or panel, industrial vs. developing, ...

What the model explains — and what it cannot

Overall fit: $\bar{R}^2 \approx 0.44$–0.55 for developing countries; somewhat lower for industrial.

Structural fundamentals do significant work:

- Fiscal balance, initial NFA, demographics, financial depth explain medium-term CA variation across countries
- Pattern of capital flows to developing countries (captured by time dummies) adds further explanatory power

But the model fails out of sample: Gruber and Kamin (2007) re-estimate on 1982–2003 and find:

- Model predicts a small *surplus* for the US in the early 2000s — not a -5% deficit
- Model predicts *smaller surpluses* for developing Asia — not the large surpluses observed
- The 2000s global imbalances are a regime shift unexplained by standard fundamentals

$\Rightarrow$ Motivates the Gruber–Kamin extension.

Gruber and Kamin (2007)

The financial crisis mechanism: explaining Asian surpluses

What GK do: Re-estimate the Chinn and Prasad (2003) model on 61 countries (1982–2003), then extend it with two new variables:

- A **post-financial-crisis dummy** (Caprio–Klingebiel crisis database)
- **Institutional quality** (World Governance Indicators; sovereign credit ratings)

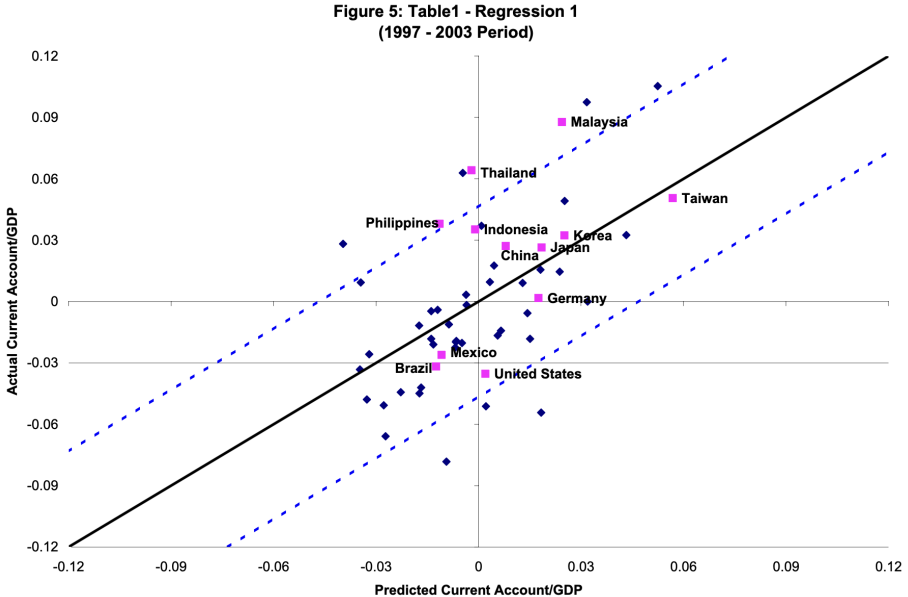
Adding the post-crisis dummy dramatically improves fit for Asian economies.

Mechanism: the 1997–98 Asian financial crisis

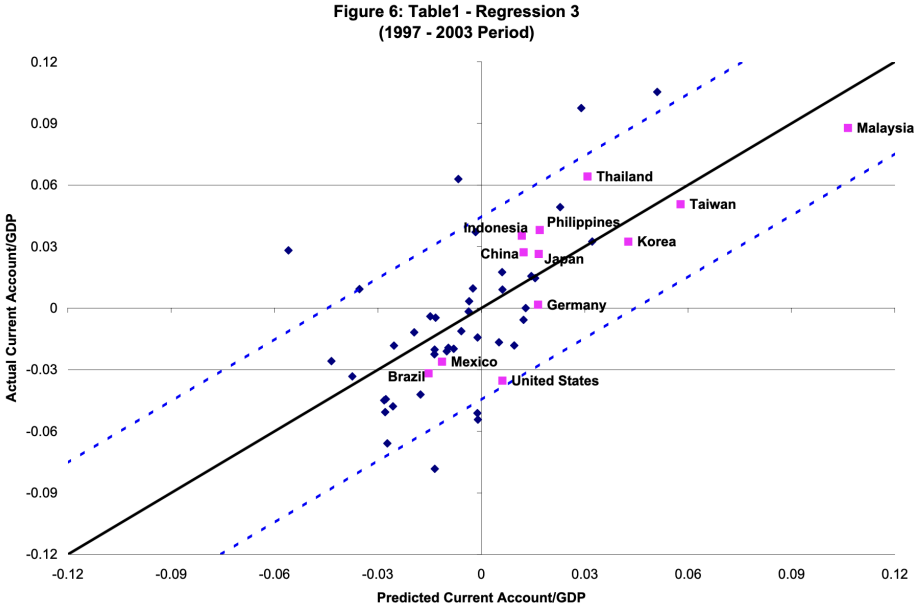
- Investment collapses post-crisis (credit crunch, balance sheet repair)
- Households save more (precautionary saving)
- Authorities keep exchange rates competitive (mercantilist policy)
- Reserve accumulation $\Rightarrow$ sterilised capital outflows

Result: the 1997–98 Asian financial crisis was the *proximate cause* of developing Asia's swing into large surpluses in 1999–2007.

The puzzle: Chinn–Prasad residuals in 1997–2003



Adding GK's extra regressors



What about the US deficit?

Adding institutional quality (World Governance Indicators, credit ratings) helps slightly — good institutions attract capital inflows $\Rightarrow$ lower CA.

But even the extended model predicts a small US *surplus*, not a -5% GDP deficit.

Residual factors not captured by any regression:

- Dollar's reserve currency status ("exorbitant privilege")
- Bretton Woods II dynamic (Asian central banks recycled export earnings into US Treasuries)
- US financial innovation and deep Treasury market
- Unique safe-haven demand in risk-off episodes

Implication: The US CA deficit is structurally exceptional. Understanding it requires looking beyond standard regression variables

Wrap-up and Project Guidance

Key takeaways: Lecture 1

1. Getting set up and the S–I identity: $CA = S - I$

2. Intertemporal theory: countries use the CA to smooth consumption.

- Temporary shocks $\Rightarrow$ borrow/lend; CA moves a lot, consumption little
- Permanent shocks $\Rightarrow$ adjust consumption; CA barely moves
- Good news about the future $\Rightarrow$ CA deficit today

3. Twin deficits: a tax cut alone does *not* cause a CA deficit (if Ricardian equivalence holds). A temporary government spending increase does.

4. Empirics: NFA, fiscal balance, demographics, and openness explain medium-term CA patterns — but not the exceptional global imbalances of the 2000s.

Project paper overview

Both papers are suitable for the group project, most likely you do a combination of both.

Chinn and Prasad (2003):

- Clean, tractable dataset (PWT + IMF WEO + Lane-Milesi-Ferretti)
- Manageable replication: run panel OLS on 5-year averages; reproduce tables

Gruber and Kamin (2007):

- Builds directly on Chinn–Prasad; adds crisis dummy and WGI institutional quality
- Slightly harder: requires constructing the crisis dummy (Caprio–Klingebiel database)

Advice: replication based on the slightly more modern GK paper, with added variables of your interest and updating the sample to most recent available data.

References I

- Barro, Robert J. (1974). “Are Government Bonds Net Wealth?” In: *Journal of Political Economy* 82.6, pp. 1095–1117. ISSN: 0022-3808. JSTOR: 1830663. (Visited on 03/24/2026).
- Chinn, Menzie D and Eswar S Prasad (Jan. 2003). “Medium-Term Determinants of Current Accounts in Industrial and Developing Countries: An Empirical Exploration”. In: *Journal of International Economics* 59.1, pp. 47–76. ISSN: 0022-1996. DOI: 10.1016/S0022-1996(02)00089-2. (Visited on 03/04/2026).
- Gruber, Joseph W. and Steven B. Kamin (June 2007). “Explaining the Global Pattern of Current Account Imbalances”. In: *Journal of International Money and Finance*. Financial Globalization and Integration 26.4, pp. 500–522. ISSN: 0261-5606. DOI: 10.1016/j.jimonfin.2007.03.003. (Visited on 03/04/2026).
- Schmitt-Grohé, Stephanie, Martín Uribe, and Michael Woodford (2022). *International Macroeconomics: A Modern Approach*. Princeton, New Jersey: Princeton University Press. ISBN: 978-0-691-17064-0.

Appendix

Derivation: Ricardian equivalence

With log utility and $\beta = 1$, the household consumption function is:

$$C_1 = \frac{1}{2}\left[(1+r_0)B_0^h + (Q_1 - T_1) + \frac{Q_2 - T_2}{1+r^*}\right]$$

Substitute the government IBC: $T_1 + \dfrac{T_2}{1+r^*} = (1+r_0)B_0^g + G_1 + \dfrac{G_2}{1+r^*}$

This eliminates T_1 and T_2 entirely, giving:

$$C_1^* = \frac{1}{2}\left[(1+r_0)\underbrace{(B_0^h + B_0^g)}_{B_0} + Q_1 - G_1 + \frac{Q_2 - G_2}{1+r^*}\right]$$

where $B_0 = B_0^h + B_0^g$ is total net foreign assets (private + government).

Conclusion: only the present value of government *spending* matters for consumption — not the *timing* of taxes.