Summary Ch 1 — Empirical facts in International Economics

Business Cycles Facts are characterized by decomposing the time series $y_t = y_t^c + y_t^s$ (cycle + trend/secular component) (Methods: HP filter, log-linear detrending, log-quadratic, time differences, Band Pass filter)

Log-linear: $y_t = \ln Y_t$ (Y_t: economic time series), then let $y_t = a + bt + \epsilon_t$, cycle: $y_t^c = \epsilon_t$, trend: $y_t^s = a + bt$; a, b can be computed via OLS (e.g. King, Plosser, Rebelo (JME, 1988))

Log-Quadratic: $y_t = a + bt + ct^2 + \epsilon_t$, cycle: $y_t^c = \epsilon_t$, trend: $y_t^s = a + bt + ct^2$, a, b, c can be estimated via OLS (e.g. Mendoza 1991)

Business Cycles Facts w/ Annual Data

Source: WDI (1960–2011), Data included for countries that have at least 30 consecutive obs. in log of GDP (Y_t), log of real Consumption (C_t), government consumption (g_t), real investment (i_t), exports (x_t), imports (m_t) (all per-capita and real)

Sample: 120 countries, 94 countries for current account

Note on Consumption: tipically studies remove durables from definition of consumption. Reason: such expenditure resembles better investment in household physical capital. Like investment it is far more volatile than consumption in non durables and services

Results: Non durable & Services consumption is less volatile than output ($\sigma_c < \sigma_y$)
Durables consumption is more volatile than output ($\sigma_{c,durables} > \sigma_y$)

σ_c/σ_y	log-linear detrending	Quadratic detrending	HP Filter
Total	1.02	1.01	0.86
Non durables	0.87	0.84	0.64
Durables	2.47	2.53	2.95

Note on trade balance and Current Account
Trade balance and current account can take on negative values then $\log(\cdot)$ cannot be used. Instead: $tb_t = \frac{X_t - M_t}{\exp(y_t^s)}$, $ca_t = \frac{CA_t}{\exp(y_t^s)}$

Ten business Cycles Facts

Fact 1: [High Global Volatility] The cross-country average standard deviation of output is about twice as large as its U.S. counterpart. — $\sigma_y^{ROW} > \sigma_y^{US}$

Fact 2: [Excess Consumption Volatility] On average across countries, private consumption including durables is more volatile than output. — w durables $\sigma_c > \sigma_y$

Fact 3: [Global Ranking of Volatilities] The ranking of cross-country average standard deviations from top to bottom is imports, investment, exports, government spending, consumption, and output. — Global Ranking: $\sigma_m > \sigma_i > \sigma_x > \sigma_g > \sigma_c > \sigma_y$ (imports) (investment)

Fact 4: [Procyclicality of the Components of Aggregate Demand] On average across countries, consumption, investment, exports, and imports are positively correlated with output. — C, M, I, X are procyclical

Fact 5: [Countercyclicality of the Trade Balance and the Current Account] On average across countries, the trade balance, trade-balance-to-output ratio, current account, and current-account-to-output ratio are negatively correlated with output. — TB, CA are countercyclical

Fact 6: [Acyclicality of the Share of Government Consumption in GDP] On average across countries, the share of government consumption in output is roughly uncorrelated with output. — G/Y is acyclical

Fact 7: [Persistence] The components of aggregate supply (output and imports) and aggregate demand (consumption, government spending, investment, and exports) are all positively serially correlated. — Serial Correlation in all components of Agg. Supply and Agg. demand (y, im; and c, g, i, x).

Fact 8: [Excess Volatility of Poor and Emerging Countries] Business cycles in emerging or poor countries are about twice as volatile as business cycles in rich countries.

Fact 9: [Excess Consumption Volatility in Poor and Emerging Countries] The relative consumption volatility is higher in poor and emerging countries than in rich countries.

Fact 10: [The Countercyclicality of Government Spending Increases with Income] The share of government consumption is countercyclical in rich countries, but acyclical in emerging and poor countries.

Note on HP filter:

given y_t, pick y_t^s, y_t^c to solve: $\min_{\{y_t^s, y_t^c\}_{t=1}^T} \left\{ \sum_{t=1}^{T} (y_t^c)^2 + \lambda \sum_{t=2}^{T-1} [(y_{t+1}^s - y_t^s) - (y_t^s - y_{t-1}^s)]^2 \right\}$ s.t. $y_t^s + y_t^c = y_t$

as $\lambda \to \infty$ Δy^s become costly $\Rightarrow$ y^s converges to linear trend
as $\lambda \to 0$ the cycle disappears ($y^c = 0$) ($y^s = y_t$)

in matrix form: $\min_{Y^s} (Y - Y^s)'(Y - Y^s) + \lambda (Y^{s\prime} B' B Y^s)$ $B = \begin{bmatrix} 1 & -2 & 1 & 0 & \dots \\ 0 & 1 & -2 & 1 & 0 \dots \\ \dots & & \dots & & \\ \dots & 0 & 1 & -2 & 1 \end{bmatrix}$

FOC: $-(Y - Y^s) + \lambda B' B Y^s = 0 \Rightarrow Y^s = (I + \lambda B' B)^{-1} Y$ ($\Rightarrow$ HP is a linear filter)

RoW vs. US

US1: $\sigma_y^{RoW} > \sigma_y^{US}$
US4: g/y is countercyclical
US5: US is less open than RoW ($\frac{X+M}{Y}$ 240% in RoW vs 99% in US)

Countries Comparison by Income

Classification by per-capita GDP: < $3000 Poor (40, 1/3); $3000–$25000 Emerging (58, 1/2); > $25000 Rich (22, 1/6)

Fact 8: $\sigma_y^{EME}, \sigma_y^{Poor} > \sigma_y^{Rich}$

Excess volatility: 8.7% 6.1% 3.3%

Fact 9: $\frac{\sigma_c^{Poor}}{\sigma_y} > \frac{\sigma_c^{EME}}{\sigma_y} > \frac{\sigma_c^{Rich}}{\sigma_y}$ Poor & EMEs smooth consumption by less

Fact 10: Countercyclicality of Gov. Spending increases w/ income
Corr(g/y, y): Poor: 0.08, EME: −0.08, Rich: −0.39
also the government consumption is countercyclical in rich countries, but acyclical in EMEs & Poor countries

Quarterly Data

Not many long series $n^{annual} = 120$, $n^{quarterly} = 28$
Sample Period: 1980Q1–2012Q4
Facts 5, 8, 9, 10 remain to hold.