L1 - Analysis of Domestic Demand

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Course on Macroeconomic Diagnostics (OT 15.14)

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Why Are We Interested in Analyzing Domestic Demand?

- Fluctuations in domestic demand play an important role in economic cycles.
- The behavior of domestic demand relative to national income determines the external current account which is important for assessing external sustainability.
- The levels of consumption/saving and investment have important implications for current and future economic welfare.

Outline

- Measurement and data issues
- Short-term analysis of aggregate demand
- Analyzing private investment
- Analyzing private consumption

1. Measurement and Data Issues

Measuring Real GDP

- Typically, GDP is aggregated from several raw series.
- One needs some basis for aggregating individual measures – for example, how do you add a ton of steel and a gallon of milk?
- The standard approach is to use prices of a base year as aggregation weights:

$$Y_{2008}(in\ 2006\ prices) = \sum_{i=1}^{N} P_i^{2006} * Q_i^{2008}$$

- The problem comes when ***relative prices*** change.

Relative Price Changes

- Suppose that the relative prices of some goods are declining, and that the relative demand for those goods is rising as a result.
- Using old price weights will tend to produce ***higher*** estimates of GDP growth than if more recent weights are used.
- Example: The demand for IT-intensive goods has been rising rapidly, while the relative prices of these goods have been falling rapidly. As a result, real GDP growth rates have tended to be ***biased upward***, when measured with fixed weights.
- To reduce the bias, one should measure real GDP with non-fixed weights.

U.S. GDP Growth in 1998 Using Different Fixed-Weight Base Periods

The growth rate of fixed-weight real GDP in 1998 was:

- 4.5 percent using 1995 as the base year;
- 6.5 percent using 1990 prices;
- 18.8 percent using 1980 prices; and
- 37.4 percent using 1970 prices!

Source: Whelan, Karl, 2002, A Guide to the U.S. Chain Aggregated NIPA

How to Solve the Problem?

- Changes in prices carry important information that is relevant for assessing the value of output.
- Many statistical services address this problem by rebasing the national accounts regularly. This ensures more accurate estimates of recent growth rates.
- With updated fixed weights, however, calculations of growth rates in the more distant past are problematic, as they are give too little weight to goods for which relative prices have subsequently declined
- Chained volume indices address this problem.

Chained Laspeyres Index

$$\%\Delta Y(t) = \frac{\sum_{i=1}^{N} P_i\ (t-1) * Q_i\ (t)}{\sum_{i=1}^{N} P_i\ (t-1) * Q_i\ (t-1)}$$

- The numerator is GDP(t) evaluated at period t-1 prices.
- The denominator GDP(t-1) evaluated at period t-1 prices.
- The base year is advanced each year so that quantities in each year are evaluated using prices in the previous year.

Chained Paasche Index

$$\%\Delta Y(t) = \frac{\sum_{i=1}^{N} P_i\ (t) * Q_i\ (t)}{\sum_{i=1}^{N} P_i\ (t) * Q_i\ (t-1)}$$

- The numerator is GDP(t) evaluated at period t prices.
- The denominator GDP(t-1) evaluated at period t prices.
- As before, the base year is advanced each year so that quantities in each year are evaluated using current period prices.

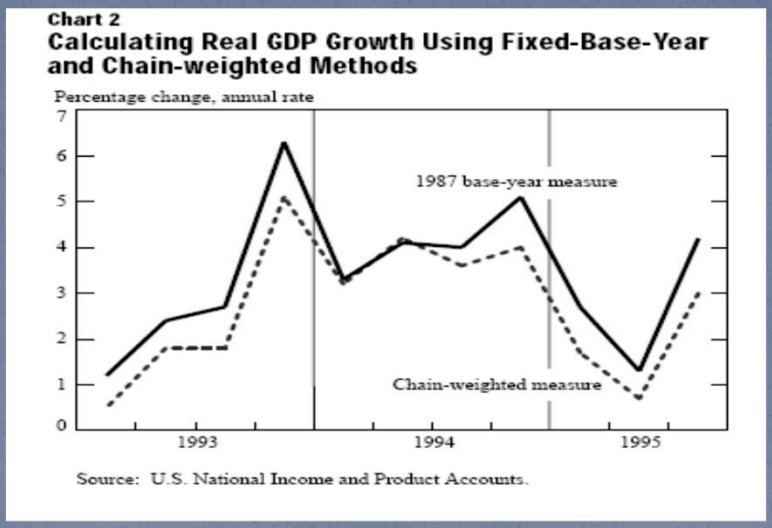
Fisher Volume Index

A geometric mean of the chained Laspeyres and Paasche indices.

$$Q(t) = Q(t-1) \sqrt{\frac{\sum_{i=1}^{n} P_i(t) Q_i(t)}{\sum_{i=1}^{n} P_i(t) Q_i(t-1)} \times \frac{\sum_{i=1}^{n} P_i(t-1) Q_i(t)}{\sum_{i=1}^{n} P_i(t-1) Q_i(t-1)}}$$

Chained-Weighted Indices

- These indices are being implemented in a number of advanced countries.
- This approach addresses mismeasurement of volumes when relative prices are changing.
- Analysis is more complicated. For example, traditional contributions to growth calculations don't work, as components of demand to not add to GDP (except reference year).
- Steindl (1995).



Steindl, Charles, 1995, "Chain Weighting: The New Approach to Measuring GDP", *Current Issues in Economics and Finance*, Volume 1, No 9

2. Short-Term Analysis of Aggregate Demand

Analyzing Recent Growth

- Trade off between high and low frequency data
- Comparing monthly or quarterly data on a year-over-year basis may not reveal recent shifts in dynamics.
- However calculating growth rates from one month or quarter to the next requires seasonal adjustment and resulting measurements are more prone to greater noise in high frequency data.

⇒Should look at both types of calculation (SA and NSA).
⇒Be aware of impact of "calendar effects" (e.g., timing of Easter, Ramadan)
⇒Take into account the effects of "quarterly arithmetic" in making projections for annual averages.

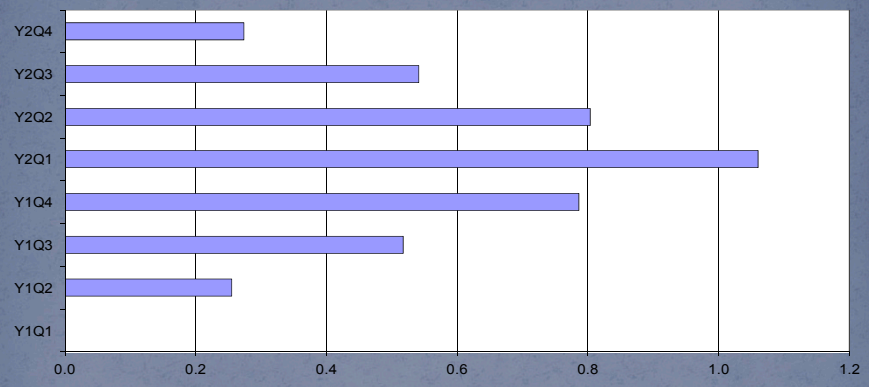
Quarterly Arithmetic

- Rule: growth in t+1 can be *approximated* where Q is quarterly *seasonally-adjusted* growth at an annual rate
- What happens if there is a one-time boost to growth in Q4 of year 1, which is not reversed in subsequent quarters?

$$\%\Delta GDP_{t+1} = \frac{1}{16}Q2_t + \frac{2}{16}Q3_t + \frac{3}{16}Q4_t + \frac{4}{16}Q1_{t+1} + \frac{3}{16}Q2_{t+1} + \frac{2}{16}Q3_{t+1} \frac{1}{16}Q4_{t+1}$$

- Thus, some of through-the-year growth in year t caries over into year average growth in year t+1. Carry over can be calculated as Q4 of t divided by year average of t.
- The first quarter of the year t+1 is the most important in determining the annual growth rate. The last quarter of year t and the second quarter in year (t+1) are also relatively important.

Example of Quarterly Arithmetic



Quarterly arithmetic allows you to distribute an outlying observation in Y2Q1 across past and forthcoming quarters. The resulting time series will be smoother.

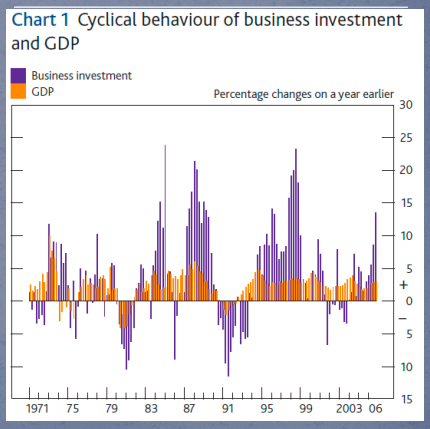
3. Investment

- Data
- The theory
- Using investment equilibrium concepts in diagnostics
- Investment and relative price changes
- Measuring the capital stock

Investment: Data (1)

United Kingdom

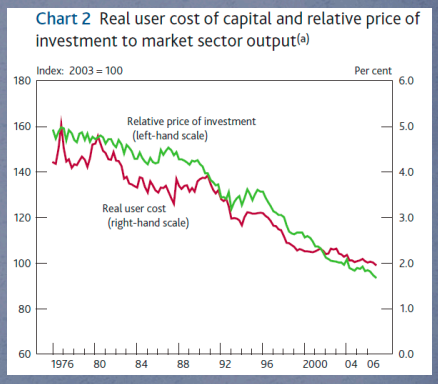
- The cyclical behavior of investment makes a substantial contribution to fluctuations in GDP
  - Investment growth is more volatile than that of GDP.
- Key to understand long-run trends in investment and its fluctuations during the business cycle.



Investment: Data (2)

United Kingdom

- User cost of capital: amount that an owner of capital would pay if he or she were renting it, instead of owning it.
- Strong trend decline in the user cost in the UK.



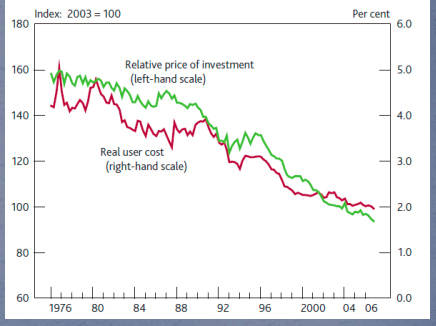
Source: Bank of England

Investment: Data (3)

United Kingdom

- The impact of the real user cost of capital on investment depends on the elasticity of substitution between capital and labor (σ);
  - $\sigma = 1$ ➔ 1% fall in real cost of capital ➔ 1% increase in inv. to output ratio;
  - $\sigma = 0$ no rise in investment if real cost of capital falls.
  - $\sigma = 0.4$ for the UK.

Chart 2 Real user cost of capital and relative price of investment to market sector output[a]



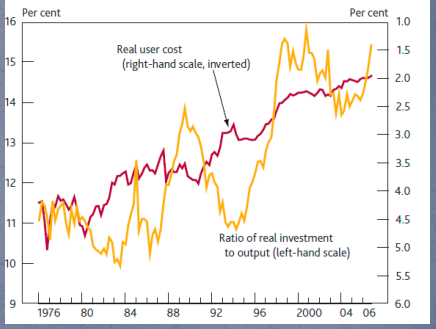
Source: Bank of England

Investment: Data (4)

United Kingdom

- Declining user cost of capital likely to explain the upward trend in the ratio of business investment to output…
- …Yet deviations in the business-investment ratio from its long-run trend can be large.

Chart 3 Real user cost of capital and ratio of business investment to market sector output

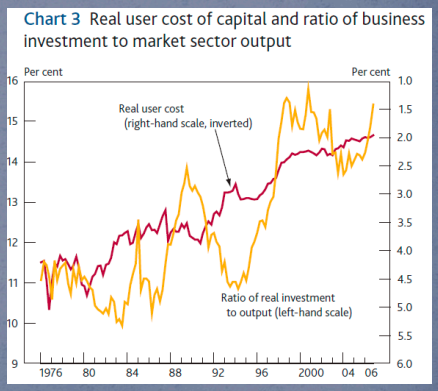


Source: Bank of England

Investment: Data (5)

United Kingdom

- Why is investment so volatile in the short run?
  - Adjustment costs (neo-Keynesian models).
  - Uncertainty.
  - Financial constraints.
- See Baumann and Price (2007)



Source: Bank of England

Investment: the Theory (1)

- Neoclassical theory
- Investment related to demand for capital stock.
- Y= f(A, L, K)
  - A: technological progress
  - L: labor supply
  - K: capital stock
  - Constant returns to scale
- The firm's optimal capital stock is the one at which the marginal product of capital is equal to the marginal cost of capital.

Investment: the Theory (2)

- Baumann and Price (2007)
- Growth theory suggests three important long-run (steady-state) properties for investment and the capital stock.

  1). capital-to-output (K/Y) and the investment-to-output (I/Y) ratios are constant in the long run.

Investment: the Theory (3)

2). long-run investment and capital depend positively on:

- planned production levels

and negatively on:

- the real user cost of capital (r)
  - Higher **r** → decline in the firm's desired **K** stock → lower investment. Importance of the elasticity of substitution (σ) between K and L
- the real interest rate
- the rate of depreciation of K stock
- the tax rate on investment

Investment: the Theory (4)

3). the optimal long-run investment rate (I/Y)* is proportional to (K/Y)*.

$$(I/Y)^* = [(g + \delta)/(1+g)](K/Y)^*$$

- The equilibrium investment rate must be higher:
  - to sustain a faster growth rate for output (g)
  - to sustain a higher desired capital-to-output ratio (K/Y)*
- Policy implications: Poor access to domestic or international capital markets can also depress investment rates and the steady-state K/Y ratio.

Investment: the Theory (5)

- Intuition: in steady state equilibrium investment must be higher
  - to sustain a faster growth rate of real GDP (g)
  - to sustain a higher desired capital to output ratio (K/Y)
  - to offset high capital depreciation rates (δ)
- Note:
  - Equilibrium values of these variables might differ across countries and over time;
  - Actual values of capital stock may considerably differ from steady state values.

Using Investment Equilibrium Concept in Diagnostics (1)

$$I/Y=[(g + \delta)/(1+g)](K/Y)$$

- Assume some plausible values for the underlying (medium-to-longer term values) of r.h.s. variables.
- Compare actual I/Y to the I/Y that is produced by the above formula, to provide a sense of whether investment levels are sustainable in medium-term context.

Using Investment Equilibrium Concept in Diagnostics (2)

- Limited use in understanding short-run dynamics
- Can however be helpful in flagging problems
  - If current investment is higher relative to what is needed to maintain a plausible equilibrium K/Y;
  - If rate of increase of K is large;
  - It is useful to look at which sectors K is growing rapidly and what type of K.
    - Excesses of short-lived investment are worked off quickly, but can have a protracted effect in the case of long-lived assets (i.e. real estate).

Estimating the Capital Stock

- Perpetual inventory method to estimate time t capital stock:

$$K_t=(1-\delta)K_{t-1}+I_t$$

- Estimate (or assume) initial K position some time in the past and accumulate I, depreciating existing K along the way.
- Errors in capturing initial capital stock diminish in significance over time. What matters is the depreciation rate.
- This methodology for estimating K can be used at relatively aggregated levels or disaggregate level.

4. Private Consumption

- Theoretical considerations
- What influences individual saving decisions?
- Measurement issues

Theoretical Considerations: Equilibrium Saving in Closed Economy

- Closed economy ➔ S=I
- In *equilibrium*, we know that

$$(I/Y)^* = [(g + \delta)/(1+g)](K/Y)^*$$

- Hence

$$(S/Y)^* = [(g + \delta)/(1+g)](K/Y)^*$$

- As I/Y, (S/Y)* depends on the output growth rate, the K depreciation rate and on (K/Y)*.

Theoretical Considerations: Cross- Country and Intertemporal Comparisons of Investment

Adding external financing: subtract CA deficit-to-GDP ratio.

$$(S/Y)^* = [(g + \delta)/(1+g)](K/Y)^* - (CA/Y)^*$$

The steady state equilibrium value of these variables might differ considerably across countries and over time.

What Influences Individual Saving Decisions?

- Consumers distribute consumption throughout their lives so as to maximize lifetime utility, taking account of :
  - expectations on future income
  - uncertainty about future income
  - the rate of return on their assets
  - borrowing limits in the financial markets

What Influences Individual Saving Decisions? Expectations on Future Income

- A permanent rise in expected growth over previous trend?
- A one period rise in income growth, with income growth then expected to return to its previous trend?
- A one period acceleration in income growth, expected to be offset by lower than trend growth the following year, with growth expected to return to trend in year three?

What will happen to the saving rate in the year of the "news" and subsequent years?

What Influences Individual Saving Decisions? Permanent Changes in the Growth Rate (1)

- The following two slides illustrate the effects of a permanent increase in income growth on consumption and asset accumulation, on the assumption that consumers want to equalize consumption across time periods
- Interest earnings are ignored for simplicity.
- The illustration is from the perspective of an individual at the beginning of his/her working life.

What Influences Individual Saving Decisions? Permanent Changes in the Growth Rate (2)

Baseline scenario: 0% real income growth, 0 real interest rate, no discount rate

Period	1	2	3	4	5	6	7	8	9
Income	100	100	100	100	100	100	0	0	0
Consumption	66.7	66.7	66.7	66.7	66.7	66.7	66.7	66.7	66.7
Assets	33.3	66.7	100	133.3	166.7	200	133.3	66.7	0
Saving rate	33%	33%	33%	33%	33%	33%			

What Influences Individual Saving Decisions? Permanent Changes in the Growth Rate (3)

Alternative scenario: 4% real income growth, 0 real interest rate, no discount rate

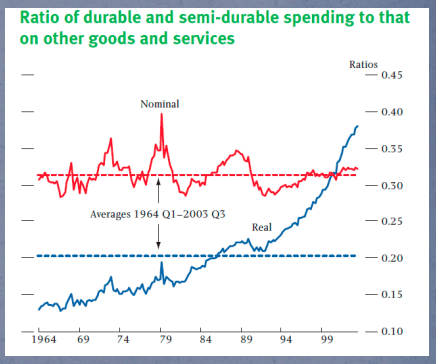
Period	1	2	3	4	5	6	7	8	9
Income	100	104	108.2	112.5	117	121.7	0	0	0
Consumption	73.7	73.7	73.7	73.7	73.7	73.7	73.7	73.7	73.7
Assets	26.3	56.6	91.1	129.8	173.1	221.1	147.4	73.7	0
Saving rate	26%	29%	32%	34%	37%	39%			

What Influences Individual Saving Decisions? Permanent Changes in Growth Rate (4)

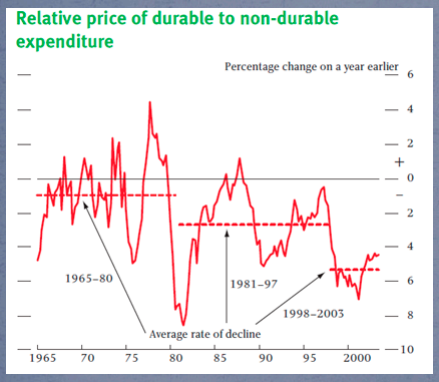
- There is a decline in the saving rate early in the working life, as consumers anticipate higher future incomes, offset by higher saving rates later.
- Effects
  - Consumption is higher in every period compared to baseline
  - Faster accumulation of assets
  - The saving rate declines initially but then it recovers; the average saving rate does not change significantly
- Wealth effects matter to project consumption and asset accumulation.

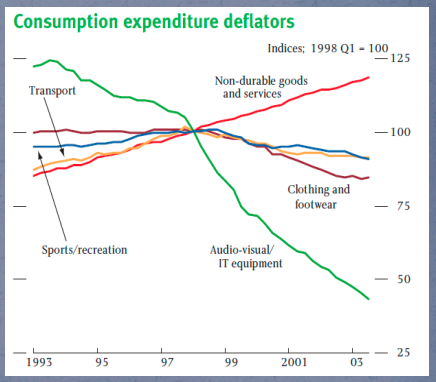
Case Study: the UK (1)

- Falling relative price of durable to non-durable goods and services.
- Real ratio of durable spending to other consumption expenditure has risen since 1964 while the nominal ratio has remained relatively flat.
- Real ratio is now well above its average, unlike the nominal ratio.



Case Study: The UK (2)



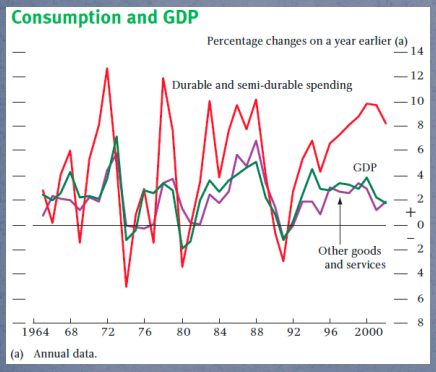


Case Study: the UK (3)

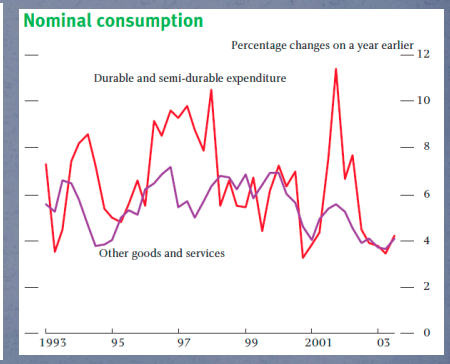
- Spending on consumer durables is significant part of investment, as goods last many years.
- Thus, typically spending on durables is not the same as the consumption of durable goods.
- High variance; durables spending can be treated as investment.

Case Study: the UK (4)

United Kingdom



United Kingdom



Measurement Issues to Project Private Consumption (1)

- Demand for consumer durables can be approached in a similar fashion to that for business capital.
- Estimates of the stock of consumer durables can also be made by perpetual inventory method.
- Durable spending needed to keep stock of durables constant relative to output can used as a diagnostic tool.

Measurement Issues to Project Private Consumption (2)

Difficulties to forecast private consumption

- Increased uncertainty about future (volatile) incomes;
- Risk aversion and imperfect financial markets;
- Saving rate may be higher as households build up precautionary savings.

Measurement Issues to Project Private Consumption (3)

Financial market imperfections can constrain private consumption

- Can assets be used as collateral?
- Limits to insurance markets (➔limits to inter-temporal consumption smoothing)
- Structural changes in financial markets: temporary or permanent effect on private consumption?

Measurement Issues to Project Private Consumption (4)

Government borrowing may constrain private consumption

- Ricardian mechanisms
- What are the purposes of government borrowing?
  - Distinguish between borrowing for spending that boosts future productivity with other spending
- Which generation bears the burden?
- How are the result affected by the operation of financial markets?

Measurement Issues to Project Private Consumption (5)

Wealth effects on savings

- Assets are a resource supporting individual consumption; an increase in asset prices boosts individual's consumption ➔ Might expect a close relationship between spending and asset prices.

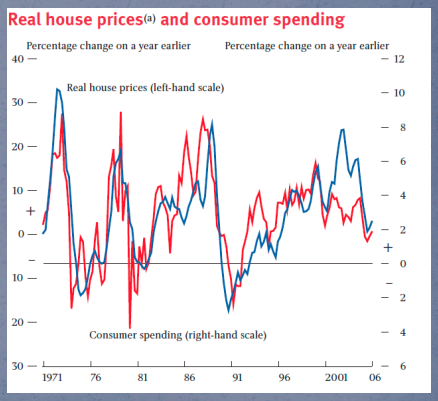
Which assets should be included to measure wealth?

- Assets producing goods and services;
- Financial assets;
- Human capital.

Coefficients of wealth vary considerably across countries and time.

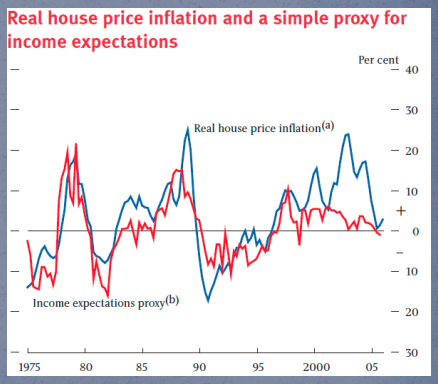
Measurement Issues to Project Private Consumption (6)

- Until 2000, real house prices and consumer spending were very closely related.
- However, disconnect 2000 until 2005. No longer common elements affecting house prices and consumer spending



Measurement Issues to Project Private Consumption (7)

- Movements in house prices have typically been accompanied by similar fluctuations in indicators of expected income…
- …But the indicators of income expectations have remained relatively stable over the past few years.



Background slides

The Steady State Relationship between Investment and Capital (1)

By definition, the *ratio of investment to the capital stock* is the rate of growth of capital plus the rate of depreciation of the capital stock.

$$K_t - K_{t-1} = I_t - \delta K_{t-1}$$

$$\Delta K_t / K_{t-1} = I_t / K_{t-1} - \delta$$

$$I_t / K_{t-1} = \Delta K_t / K_{t-1} + \delta$$

In *equilibrium* this will be equal to the growth of output plus the rate of K depreciation

$$I/K = g + \delta$$

The Steady State Relationship between Investment and Capital (2)

By definition, the *ratio of investment to output* can be written:

$$(I/Y)_t = (I_t/K_{t-1})(K_{t-1}/Y_t)$$
$$= (I_t/K_{t-1})(K/Y)_{t-1}(Y_{t-1}/Y_t)$$

Plugging (I_t/K_{t-1}) from the previous slide and the rate of real GDP growth yields

$$(I/Y)_t = [(g + \delta)/(1+g)](K/Y)_{t-1}$$

Steady state: I/Y is proportional to K/Y

$$(I/Y)^* = [(g + \delta)/(1+g)](K/Y)^*$$

L-2. Supply and Productivity

Course on Macroeconomic Diagnostics
Dar Es Salaam, Tanzania
November 30–December 10, 2015

Lecture by Irina Yakadina
Institute for Capacity Development, IMF

Overview

- Introduction
- Estimating business cycle
- Benchmarking business cycle
- Estimating potential output
- Growth accounting and structural indicators

Summary

- Measures of aggregate supply are useful for assessing:
  - The current state of the business cycle
  - The proximate sources of growth
  - The current stage of development
- Measures of aggregate supply need to be estimated – several approaches are available, each with its own advantages and disadvantages
- Need to benchmark the outcomes with other information

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I. Introduction

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Aggregate Supply and Demand

- Understanding an economy's level of output requires understanding
  - ***Aggregate supply*** – the country's ability to produce goods and services
  - ***Aggregate demand*** – the demand for a country's production of goods and services

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Two Reasons for Assessing Aggregate Supply

- **1.** to evaluate the effects of aggregate demand
  - For example, if aggregate demand > noninflationary level of aggregate supply, then we should see evidence of wage and price pressures, which might call for tighter fiscal or monetary policy
- **2.** to understand the longer-term prospects of a country
  - If the country is less developed, is it converging with its richer neighbors?
  - Are there changes in structural policies that could speed up the development process?

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Indicators of Aggregate Supply

- Over the medium-term, the ability of a country to produce goods depends on three main factors:
  - ***Physical capital*** – buildings, machinery and equipment
  - ***Employment*** – number of working-age individuals, plus their willingness to supply labor
  - ***Total factor productivity (TFP)*** – the amount of "know-how" available for efficiently combining capital and labor to produce goods and services
- Potential GDP is the level of output that can be produced, if all of factors are fully employed

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Potential GDP

- Potential GDP is, perhaps, the most important indicator of economic activity...
- ...but cannot be measured directly

→ so it is estimated

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Potential GDP

- Some other indicators of aggregate supply (natural rate of unemployment), and total factor productivity also cannot be measured directly, and need to be estimated
- Ultimately, estimating potential GDP is an econometric issue – need to select a statistical model to produce an estimate
- What we estimate, however, is rather the noninflationary product

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Potential GDP

- Potential output
  - Assumes 'perfect competition', nominal rigidities and costless substitution between production factors
- Estimation
  - Production function

$$Y_t^* = A_t K_t^{\alpha} L_t^{1-\alpha}$$

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II. Estimating Business Cycle

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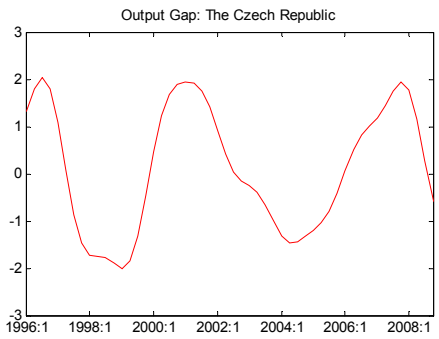
Output Gap

- The difference between actual and potential (noninflationary) GDP
- Measure of the business cycle position
- Relevant for
  - Monetary policy
  - Fiscal policy



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Several Modeling Approaches

- Quick and Dirty (atheoretical):
  - **Time trend**
  - **Hodrick-Prescott Filter**
  - Other filters (Band-Pass, Kalman)
- Intermediate Approaches (quasi-theoretical):
  - **Production function approach**
  - Unobserved components models (multivariate filters)
- Dynamic stochastic general equilibrium models (theoretical)

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Deterministic Time Trend

- A very simple approach is to estimate the following regression, using OLS

$$y_t = \alpha + \beta t + \varepsilon_t \quad with \quad y_t = ln\left(Y_t\right)$$

- Potential output is the predictable part of the regression

$$y_t^* = \hat{\alpha} + \hat{\beta} t \quad with \quad Y_t^* = exp\left(y_t^*\right)$$

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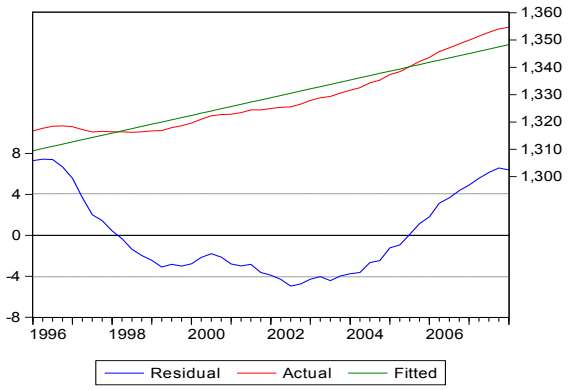
Deterministic Time Trend



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Hodrick-Prescott Filter

$$\min \sum_{t=0}^{T}\left(y_t - y_t^*\right)^2 + \lambda \sum_{t=2}^{T-1}\left[\left(y_{t+1}^* - y_t^*\right) - \left(y_t^* - y_{t-1}^*\right)\right]^2$$

Output gap

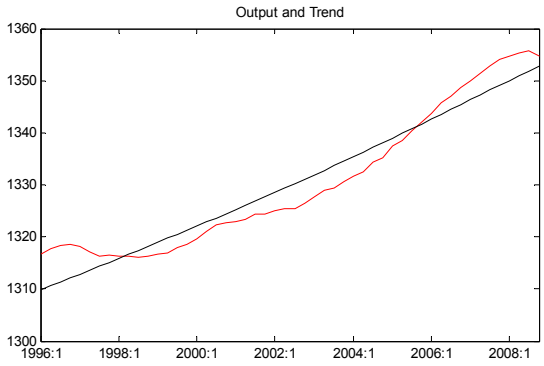
Change in growth of potential output

where
y* = natural log (ln) trend output;
y = natural log (ln) actual output
λ determines the degree of smoothness of the trend

Shortcomings:
- End-sample bias
- Lack of economic foundation

70

Infinite Weight on Smoothness ($\lambda=\infty$)



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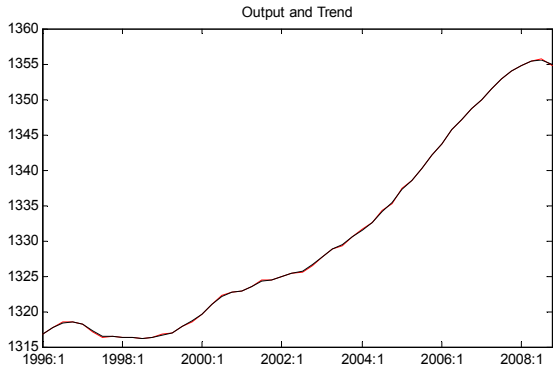
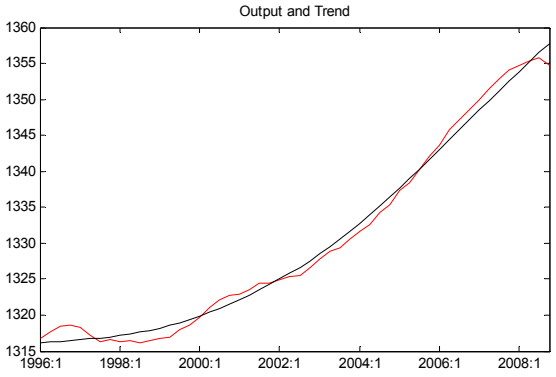
Zero Weight on Smoothness ($\lambda=0$)



72

Typical Weight on Smoothness (λ=1400 for quarterly data, 100 for annual data)



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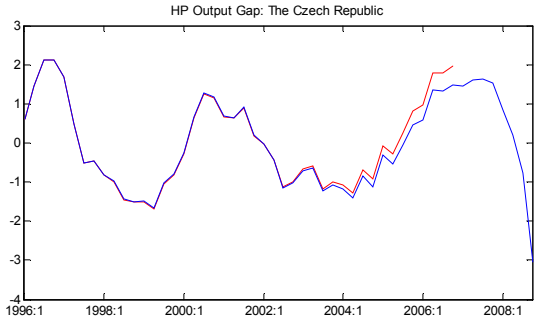
End-point bias

- What if we were estimating the level of potential at the ***end of 2006***?
- What if we were estimating the level of potential at the ***end of 2008***?



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II. Benchmarking Business Cycle

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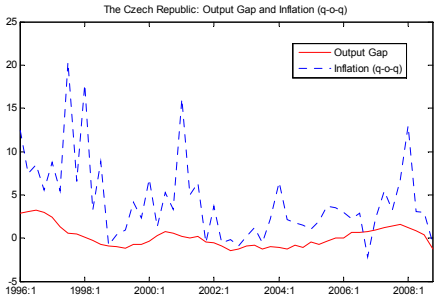
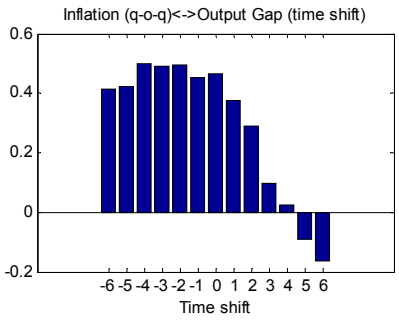
Output Gap and CPI Inflation





Cross-correlation
Zero means contemporaneous correlation

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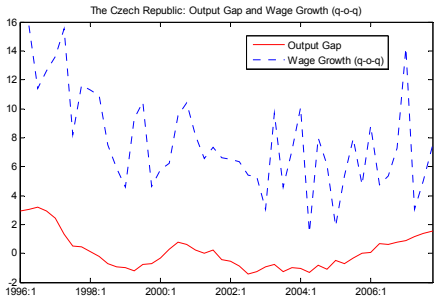
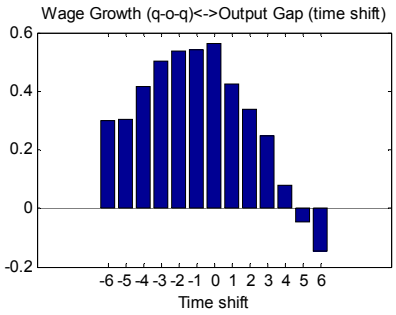
Output Gap and Wage Growth





Cross-correlation

Zero means contemporaneous correlation

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III. Estimating Potential Output

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Leaving the business cycle behind …

- Production function enables to discuss the determinants of potential output, not only the output gap
  - Rate of capital accumulation
  - Growth rate of labor force
    - Growth rate of the working-age population
    - Labor force participation rate
    - Natural rate of unemployment
  - Growth rate of TFP

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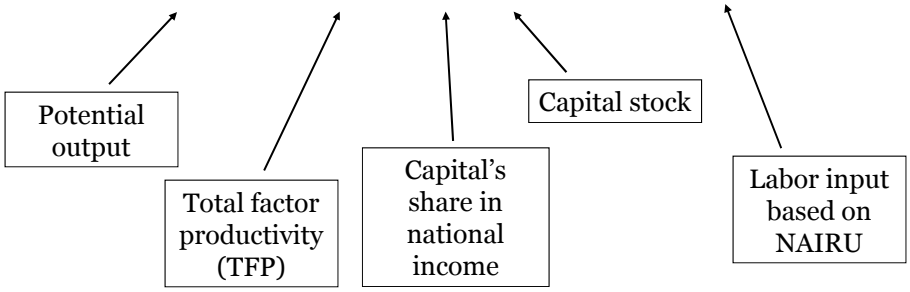
Production function

$$Y_t^* = A_t^* K_t^{\alpha} L_t^{*1-\alpha}$$

$$\ln Y_t^* = \ln A_t^* + \alpha \ln K_t + (1-\alpha) \ln L_t^*$$



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Capital stock

- Many countries have estimates of their business capital stock
- Also, the WB, the OECD, and the EC have estimated the capital stock for a number of countries
- It is also possible to estimate K for some year, and use national accounts data on investment to construct your own estimate

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Labor input

- Labor input comes from the labor force and the NAIRU
  - The labour force is represented by the economically active population, i.e. all persons aged 15 years or over who are classified as employed or unemployed according to the ILO methodology
  - NAIRU stands for the non-accelerating inflation rate of unemployment (must be estimated)

$$L^* = \hat{L} \cdot (1 - NAIRU)$$

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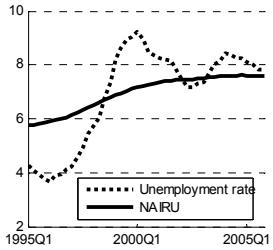
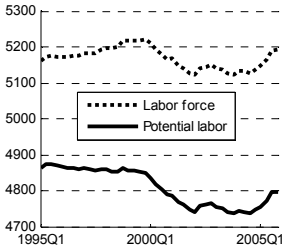
Labor input (Czech Republic, 1995-2005)

Figure 4.2: The Components of Potential Labour *(1995Q1–2005Q4)*

Unemployment rate and the NAIRU
(in %)



Labour force and potential labour
(thousands, s.a.)



D. Hájková and J. Hurník (2007): "Supply-side Performance in the Czech Republic: A Macroeconomic View", Prague Economic Papers, 4, pp. 319-335.

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Sollow residual

- Sollow residual (TFP) is calculated as

$$A_t = \left[\frac{Y_t}{L_t^{1-\alpha} \cdot K_t^{\alpha}} \right]$$

Where Y is observed output, L is number of employed (including self-employed) people and K is capital (services)

- Labor share $(1-\alpha)$ is calculated using total labor cost and, number of employed people and gross value added

$$(1-\alpha_t) = \frac{tlc_t \cdot L_t}{gva_t}$$

  - α is calculated as average of α_t and must be kept constant

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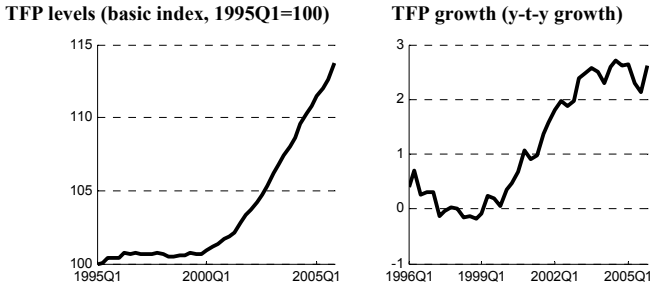
Trend total factor productivity

- TFP has trend and stochastic components
- Trend has to be estimated

Figure 4.1: Trend Total Factor Productivity (1995QI–2005Q4)



D. Hájková and J. Hurník (2007): "Supply-side Performance in the Czech Republic: A Macroeconomic View", Prague Economic Papers, 4, pp. 319-335.

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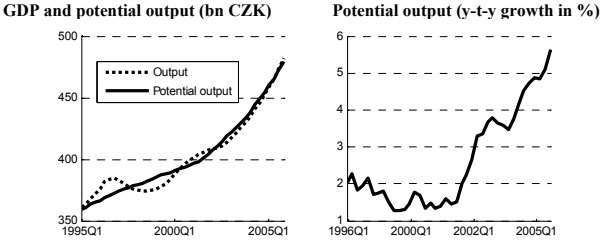
Estimating potential output

- Finally, potential output is calculated using estimated trend TFP (A*), L* and K

$$Y_t^* = A_t^* \cdot L_t^{*(1-\alpha)} \cdot K_t^{\alpha}$$

Figure 4.4: The Path of Potential Output (1995Q1–2005Q4)



- **Is there anything wrong?**

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Estimating potential output

- **Yes, a priory trend estimation**
- For calculation of A* and L* a priory trend estimation is applied
- Useful for more structural analysis
  - Growth accounting
  - Analysis of TFP growth

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IV. Growth Accounting

Growth accounting

- Growth accounting uses the production function to decompose growth into its proximate components
- Usually applied to a span of data to eliminate business cycle fluctuations
- Results can be used for structural story

$$Y_t = A_t K_t^{\alpha} L_t^{1-\alpha}$$

$$\ln Y_t = \ln A_t + \alpha \ln K_t + (1-\alpha)\ln L_t$$

α_t is no more constant

$$\Delta \ln Y_t = \Delta \ln A_t + \hat{\alpha}_t \Delta \ln K_t + (1-\hat{\alpha}_t)\Delta \ln L_t$$

$$\hat{\alpha}_t = \frac{1}{2}(\alpha_{t-1} + \alpha_t)$$

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Growth accounting

- Two options
  - Use observed values and talk about "average" growth
  - Use smoothed (detrended) values like in potential output estimation and talk about potential output growth
    - Notice: there is no level of potential output though

$$\Delta \ln Y_t = \Delta \ln A_t + \hat{\alpha}_t \Delta \ln K_t + (1-\hat{\alpha}_t)\Delta \ln L_t$$

$$\Delta \ln Y_t^* = \Delta \ln A_t^* + \alpha_t^* \Delta \ln K_t + (1-\alpha_t^*)\Delta \ln L_t^*$$

α_t^* is a smoothed version of α_t

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Growth accounting

- Structural story
  - Well functioning supply side requires that the potential output growth is not driven solely by one factor
  - Growing capital while TFP remains negative may signal misallocation of investment; growing capital and TFP signals improvements in supply side functioning
  - Declining potential labor because of rising NAIRU signals inefficiencies on the labor market
    - Increase in social benefits
    - Higher protection of employees
    - Stronger unions (insider *versus* outsider problem)

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Example: Czech Republic

Table 2.1: Decomposition of Potential Output Growth (average of q-t-q annualised growth)

Potential output (%)		Contribution to growth		
		TFP (A*) (%, p.p)	Potential labour (L*) (p.p.)	Capital services (K) (p.p.)
1995	2.2	0.6	0.2	1.6
1996	2.0	0.3	-0.1	1.7
1997	1.8	0.0	0.0	1.8
1998	1.3	-0.2	0.0	1.4
1999	1.3	0.0	-0.2	1.4
2000	1.6	1.1	-0.7	1.2
2001	2.2	1.6	-0.5	1.2
2002	3.6	2.0	0.2	1.4
2003	3.4	2.5	-0.4	1.3
2004	4.6	2.6	0.1	1.9
2005	5.1	2.2	0.6	2.2
1995–2005	**2.7**	**1.2**	**-0.1**	**1.6**

- Potential output growth speeded up considerably in the post 2000 period
- What caused the increase?

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Example: Czech Republic

- Structural story
  - Very poor behavior of the supply side in the second half of 1990s
    - Potential output driven solely by capital
      - Investment misallocation
      - Rising NAIRU
  - Improvement since 2000/2001
    - More balanced growth
    - Better allocation of investment – FDI?
    - NAIRU remains high, but stops increasing

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Structural indicators

- Indicators related to the long-term growth
  - Share of informal (shadow) economy and its productivity
    - Marginal tax on labor
  - Employment rigidity and protection
    - Minimum wage (share on average or similar)
  - Market competitiveness and regulation
    - Barriers of doing business
    - Local prices of world-wide similar products (electricity, telecommunications)

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Summary

- Measures of aggregate supply are useful for assessing:
  - The current state of the business cycle
  - The proximate sources of growth
  - The current stage of development
- Measures of aggregate supply need to be estimated – several approaches are available, each with its own advantages and disadvantages
- Need to benchmark the outcomes with other information

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Main takeaways

- Potential GDP is the level of output that can be produced, if all of factors are fully employed
- Some other indicators of aggregate supply (natural rate of unemployment), and total factor productivity also cannot be measured directly, and need to be estimated

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Thank you for your attention!

L-3. Analyzing Inflation

Fazeer Rahim

Course on Macroeconomic Diagnostics (OT15.14)

Dar es Salaam, Tanzania

November 30 – December 10, 2015

Outline and Objectives

- Review of the last 15 years of inflation around the world
- Measuring inflation
  - Standard measures
  - Computational issues
  - Analysis of component data
  - Measures of core inflation
- Explaining inflation
  - Long-run vs. Short/Medium-run
  - Aggregate demand vs. aggregate supply factors
  - Models of inflation dynamics

Review of the last 15 years of inflation around the world

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World: inflation, average consumer prices, (%)

Source: World Economic Outlook database, IMF, October 2015

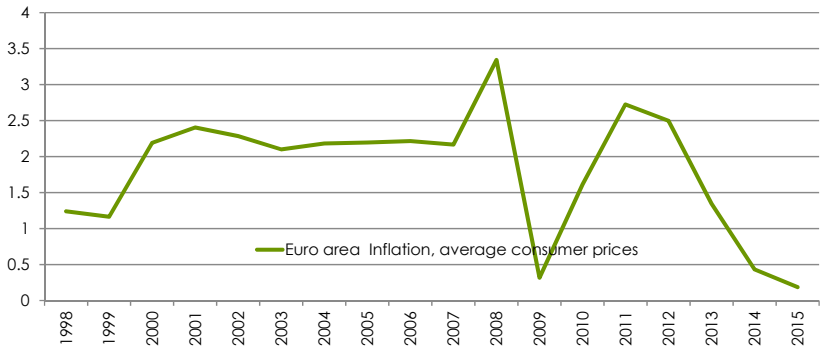
4

Advanced economies: inflation, average consumer prices, (%)

Source: World Economic Outlook database, IMF, October 2015

5

Euro area: inflation, average consumer prices, (%)



Source: World Economic Outlook database, IMF, October 2015

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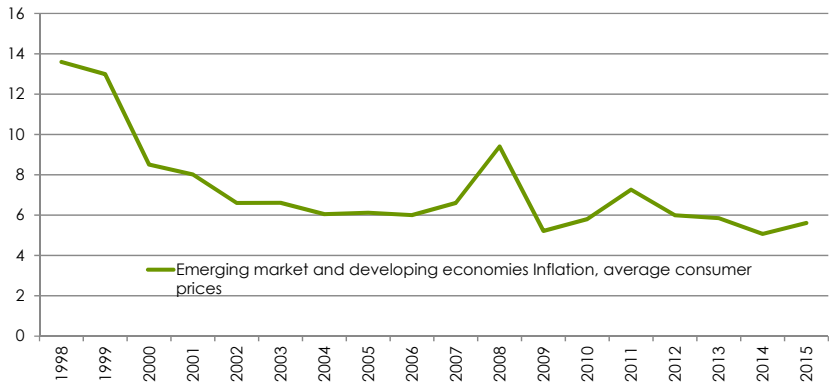
Emerging economies: inflation, average consumer prices, (%)



Source: World Economic Outlook database, IMF, October 2015

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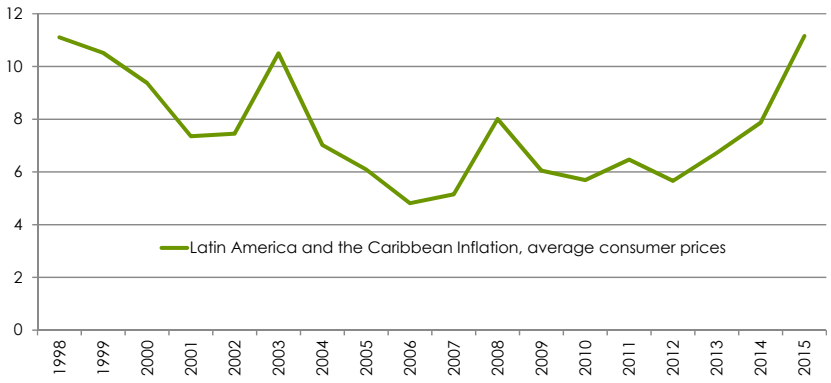
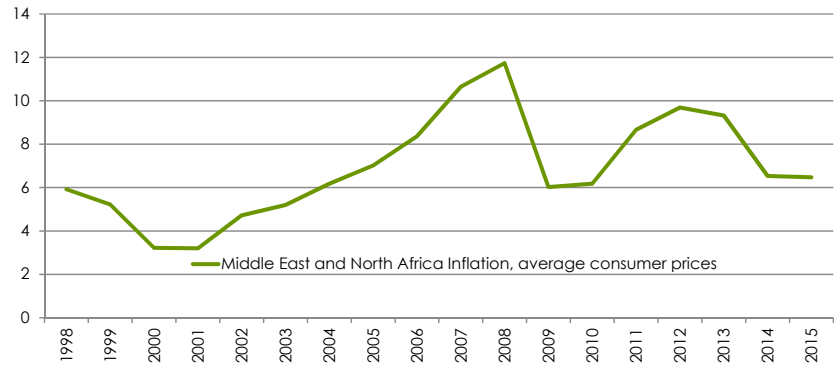
Latin America economies: inflation, average consumer prices, (%)



Source: World Economic Outlook database, IMF, October 2015

8

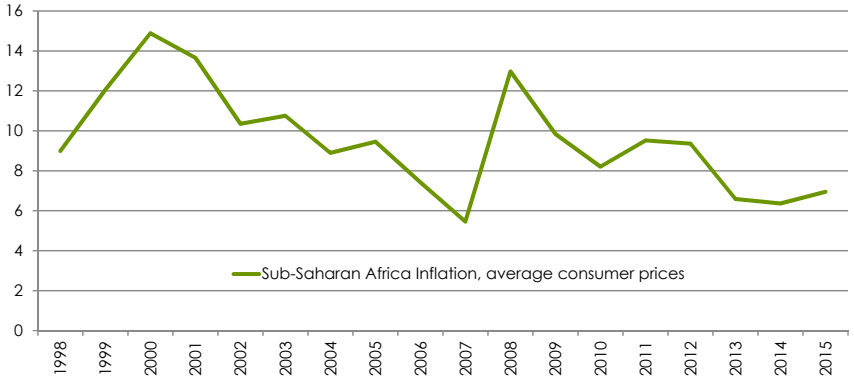
Middle East and North Africa: inflation, average consumer prices, (%)



Source: World Economic Outlook database, IMF, October 2015

9

Sub-Saharan Africa: inflation, average consumer prices, (%)



Source: World Economic Outlook database, IMF, October 2015

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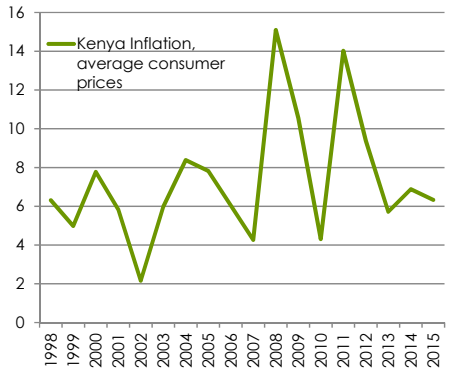
East Africa, average consumer prices, (%)



Source: World Economic Outlook database, IMF, October 2015

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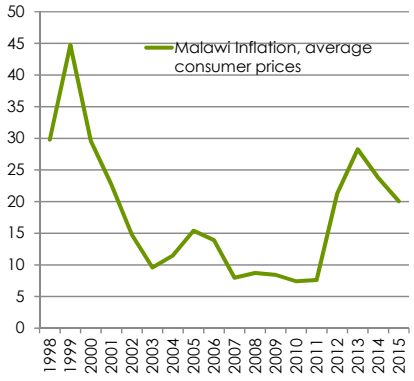
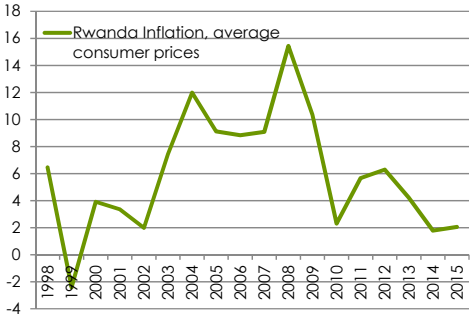
East Africa, average consumer prices, (%)





Source: World Economic Outlook database, IMF, October 2015

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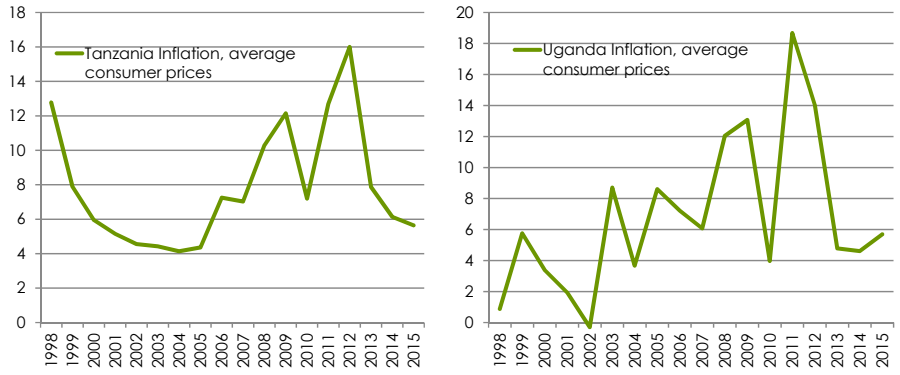
East Africa, average consumer prices, (%)



Source: World Economic Outlook database, IMF, October 2015

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Measuring inflation

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Measures of the Price level

- Indices
  - Consumer Price Index (CPI)
    - Headline Inflation
    - Additional measures computed using alternative aggregations of the component level data
  - From the National Income Accounts
    - GDP deflator
    - Personal Consumption Expenditure (PCE) deflator
  - And additional measures computed using alternative aggregations of the PCE component level data

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The Consumer Price Index

- Definition
  - An index of the cost, through time, of a fixed market basket of goods and services purchased by a typical household for consumption in some base period.
- Most widely used measure of price level
  - For indexation
  - For monetary policy

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What is included in the CPI?

- Basket is derived from detailed *expenditure survey* information provided by families and individuals on what goods and services they actually purchased
- A wide subset of goods and services
  - For the US: more than 200 categories into 8 major groups (prices of approximately 80,000 items are surveyed each month)
  - For the EU HICP: around 100 categories into 12 major groups
  - Do you happen to know the count for your country?

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US	EU HICP
Food and beverages	Food
	Alcohol and tobacco
Apparel	Clothing
Housing	Housing
	Housing equipment
Transportation	Transport
Medical Care	Health
Recreation	Recreation and culture
Education and communication	Education
	Communications
Other goods and services	Hotels and restaurants
	Miscellaneous

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How is the CPI computed?

- The CPI is a *Laspeyres* index which uses historical quantities (weights):

$$CPI_t = \frac{\sum_{i=1}^{N} p_t^i q_0^i}{\sum_{i=1}^{N} p_0^i q_0^i} \times 100$$

- q_0^i is the base period quantity of good i
- p_0^i is the base period price of good i
- p_t^i is the time t price of good i

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GDP deflator

Definition:

Deflator = Index of the price level for all final goods and services included in GDP

$$GDP\ deflator_t = \frac{GDP\ at\ current\ prices_t}{GDP\ at\ constant\ prices_t} \times 100 = \frac{\sum_{i=1}^{N} p_t^i q_t^i}{\sum_{i=1}^{N} p_0^i q_t^i} \times 100$$

The GDP deflator is computed as a *Paasche* index : current basket of goods at time t (not at time 0).

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CPI vs. GDP deflator

- CPI
  - Measures the prices of goods purchased by consumers
  - Measures the prices of all consumer goods (including imports)
  - Laspeyres index, an index with a fixed basket of goods
  - Tends to overstate the increase in the cost of living
- GDP deflator
  - Measures the prices of all final goods and services produced
  - Measures the prices of final goods and services produced domestically (excluding imports)
  - Paasche index, an index with a changing basket of goods
  - Tends to understate the increase in the cost of living

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Using the CPI inflation rate for monetary policy analysis

- Two issues
  - Bias
  - Noise
- A central bank that is unaware of bias could hold an inappropriate monetary policy stance
- A central bank that reacts to noise introduces a source of instability to the economy

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Why is the CPI biased?

- Upward bias in CPI
  - Substitution bias
  - New technologies
  - Changes in quality
  - Growth in discount shops
- Technical solutions to correct the bias
  - Geometric indices
  - Chain weighting methodology
  - Frequent rebasing
  - Hedonic statistical methods for quality change adjustments

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"Noise" in the CPI

High frequency shocks in measured inflation inaccurately reflect movements in long-run trends

- important for policy makers to correctly interpret and react if necessary to monthly movements in aggregate prices
- They need to extract as much information as possible from the CPI data

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Going beyond headline inflation

- How to extract as much information as possible from the CPI data:
  - Computing different rates of inflation (monthly, quarterly, annual....)
  - Analysis of the component level data
  - Alternative aggregation schemes
    - Goods versus services inflation
    - Traded versus non-traded goods inflation
    - Some core inflation measures

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Computing "the" inflation rate

- Various inflation rates
  - Annual average (or year-on-year) inflation rate
  - The end-of-year or December inflation rate
  - The 12-month inflation rate
  - The monthly (or the quarterly) inflation rate
  - The annualized monthly (or quarterly) inflation rate

$$= \left(\frac{CPI_{2007}}{CPI_{2006}} - 1 \right) \times 100$$

$$= \left(\frac{CPI_{\text{Dec., 2007}}}{CPI_{\text{Dec., 2006}}} - 1 \right) \times 100$$

$$= \left(\frac{CPI_{\text{Feb., 2008}}}{CPI_{\text{Feb., 2007}}} - 1 \right) \times 100$$

$$= \left(\frac{CPI_{\text{Feb., 2008}}}{CPI_{\text{Jan., 2008}}} - 1 \right) \times 100$$

$$= \left(\left(\frac{CPI_{\text{Feb., 2008}}}{CPI_{\text{Jan., 2008}}} \right)^{12} - 1 \right) \times 100$$

- Seasonal adjustment

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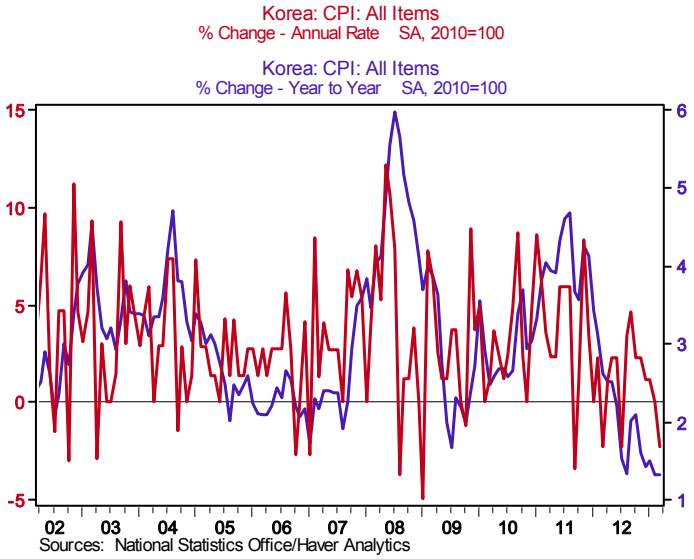

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Analysis of the component level data

- Compute percentage changes for each component
  - highlights those components where the price change was greatest
- Compute the contribution made by each component to the overall inflation rate
  - more informative
  - captures both the size of the price change *and* the importance of that component
- Caveat: Changes in specific components of the CPI do not necessarily provide a good guide to their overall impact on inflation, in part because other prices may change in response (second round effects).

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An example: Price decomposition for Mexico

- Period: March 2006 → March 2007
- Headline CPI changes: 116.8 →121.7
  - Headline inflation rate: 4.2%, Log approximation: 4.1%
  - Of which 1.5% point increase is due to price increase in food items
  - More than half the inflation rate is explained by food and housing items

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Mexico: Contributions to Inflation Mar-07/Mar-06

	Weight %	Price Indexes		Inflation		Contributions to Inflation	
		Mar-06	Mar-07	Exact	Log-Approx	Log-Approx % Points	Log-Approx %
	[A]	[B]	[C]	[D]	[E]	[F]	[G]
Food	22.7	120.0	128.3	6.9	6.7	1.5	37.3
Clothes	5.6	103.9	105.3	1.3	1.3	0.1	1.8
Housing	26.4	118.5	122.1	3.0	3.0	0.8	19.4
Furniture	4.9	103.0	104.4	1.4	1.4	0.1	1.6
Health	8.6	114.4	118.6	3.7	3.6	0.3	7.6
Transport	13.4	112.8	117	3.7	3.7	0.5	12.0
Education	11.5	123.2	128.9	4.6	4.5	0.5	12.8
Others	6.9	119.2	124.5	4.4	4.4	0.3	7.4
Aggregation	**100.0**	**116.6**	**121.4**	**4.2**	**4.1**	**4.1**	**100.0**
All items	**100.0**	**116.8**	**121.7**	**4.2**	**4.1**	**4.1**	**100.0**

[D] = ([C]/[B]-1)*100 and [E] = Log([C]) - Log([B])
[F] = [E]*[A]/100 and [G] = [F]/4.1*100

The row "Aggregation" is the sum of all the rows above in columns [A], [F] and [G], and a Cobb-Douglas aggregation of the indexes above to the power of the weights/100 in Columns [C] and [D]

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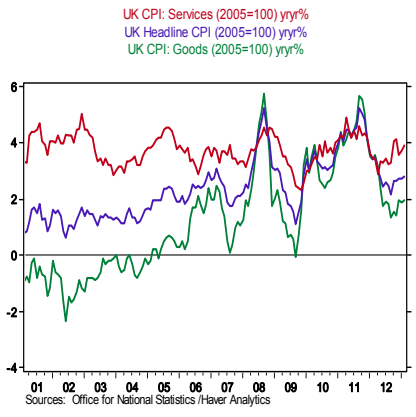
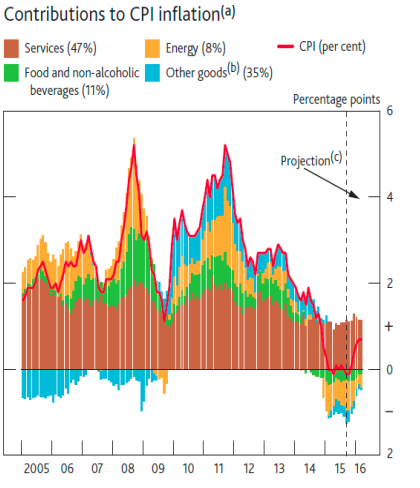
Alternative aggregation of the component level data

- Some examples:
  - Goods and Services
  - Traded versus non-traded
  - Administered versus market prices
- These measures help understand recent developments:
  - the sources of changes in the inflation rate
  - transitory or permanent shocks to inflation?

31

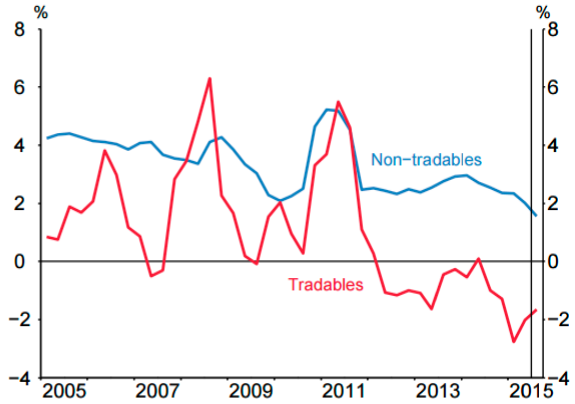




Source: Bank of England (2015), *Inflation Report*, November 2015

32

Figure 4.15
Inflation
(annual)



Source: Statistics New Zealand, RBNZ estimates.

Source: Reserve Bank of New Zealand, Monetary Policy Statement, Sept 2015

33

Underlying or core inflation?

- Refers to the long run component of CPI
- Reflects general inflationary pressures in the economy
- No firm theoretical basis; no agreed approach to measure core inflation
- Approaches to measuring core inflation
  - "Statistical"
  - Alternative weighting schemes
  - Model based

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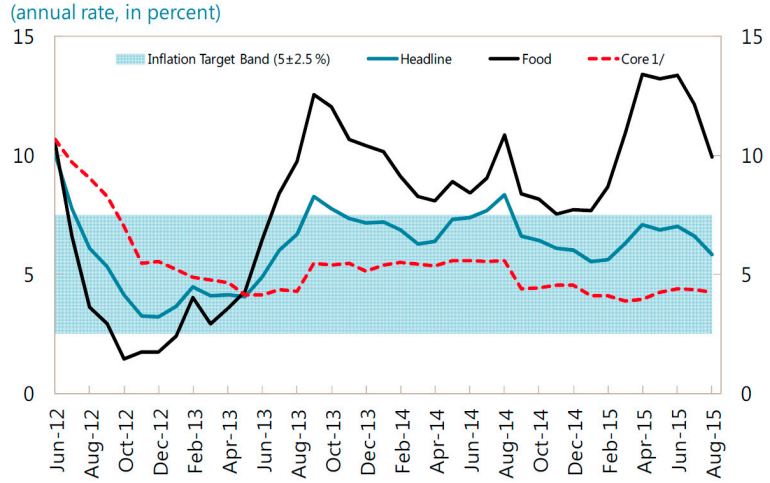
Kenya: Recent Inflation Developments

(annual rate, in percent)

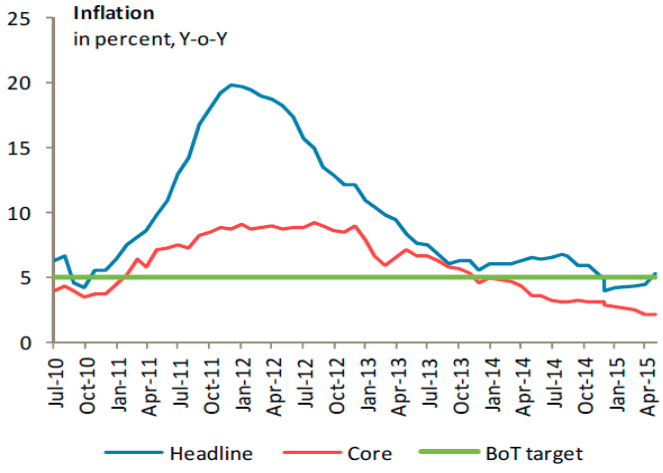


Sources: Kenyan authorities and Fund staff estimates.
1/ Core inflation excludes, food, energy, and transportation.

Source: IMF Staff Report, September 2015

35

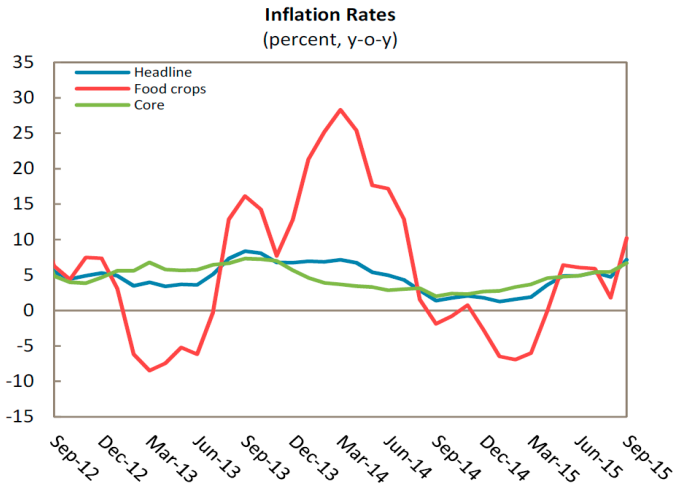
Tanzania: Core vs. headline inflation



Source: IMF Staff Report, July 2015

36

Uganda: Core vs. headline vs. food inflation



Source: IMF Staff Report, November 2015

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Core inflation

- Core inflation should:
  - Be a good indicator of the underlying *inflation trend*, provide as much information on the underlying trend as is possible from monthly data;
  - Track the component of overall price change that is *expected to persist* over time and thus be useful for near-term and medium-*term inflation forecasting;*
  - capture just the component of price change that is *common* to all items and exclude changes in the relative prices of goods and services

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Statistical approaches to measuring core inflation

- Permanent exclusion approaches
  - Exclude components that are subject to frequent and temporary price shocks
    - For example, the CPI excluding food and energy items
- Variable exclusion approaches
  - Exclude components that have large price changes during a given period
    - Trimmed mean
    - Weighted median

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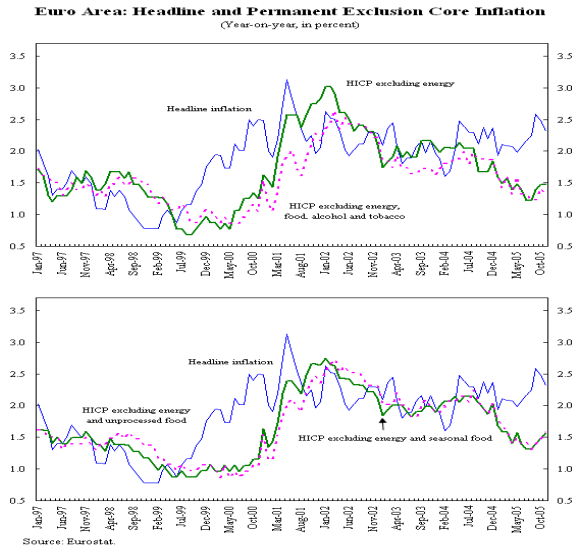
Permanent exclusions

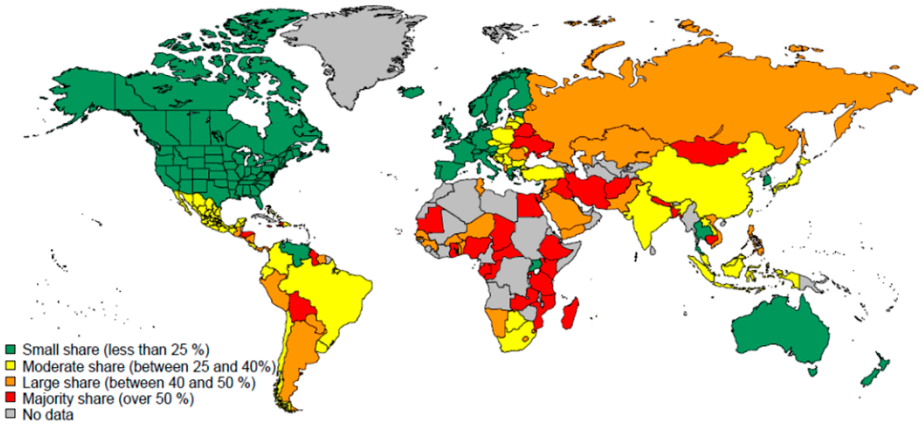


- Plus
  - *excludes known shocks*
  - *takes out noise*
- Minus
  - *subjectivity of exclusion*
  - *static measure*

Stavrev, Emil, 2006, "Measures of Underlying Inflation in the Euro Area: Assessment and Role for Informing Monetary Policy," IMF Working Paper 06/197 (Washington: International Monetary Fund).

But items excluded can be important ...

Figure 6. Shares of Food, Beverages, and Fuel in Household Expenditure, 2007 1/



Source: IMF staff estimates, based on expenditure weights used by countries to calculate the CPI.
1/ Definition of fuel weights vary and in some cases may include public transport and fuel for heat.

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Variable exclusions

- Trimmed mean
  - The trimmed mean removes from overall CPI inflation all large relative price changes in each month, with the set of excluded components changing from month to month.
  - In particular, the trimmed mean excludes the percent changes in price that rank among the smallest or largest (in numerical terms) changes for the month.

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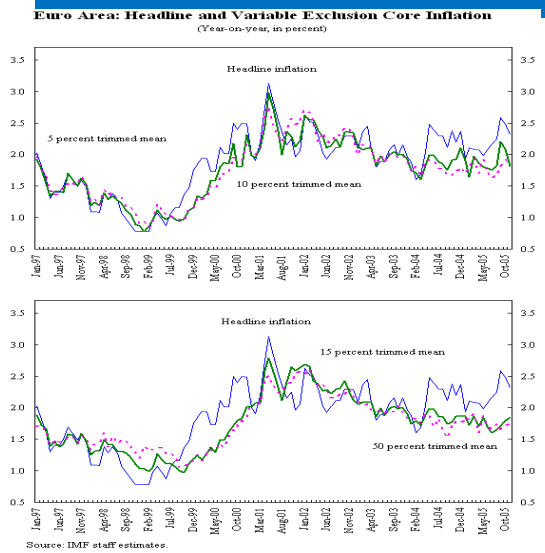
Variable Exclusions



- Plus
  - *in case of excess kurtosis superior estimators of central tendency*
- Minus
  - *The ability of the trimmed mean to exclude relative price movements, but retain price movements associated with aggregate shocks, depends on the former being at the extremes of the price distribution*
  - *Arbitrary thresholds*
  - *Important to know source of the shock*

Stavrev, Emil, 2006, "Measures of Underlying Inflation in the Euro Area: Assessment and Role for Informing Monetary Policy," IMF Working Paper 06/197 (Washington: International Monetary Fund).

Alternative approaches to computing weights

- Volatility weights
  - Most volatile components are given the lowest weight
    - Example: CPIW in Bank of Canada *Monetary Policy Report*
- Persistence weights
  - Those components whose price changes tend to be the most persistent are given the largest weight
    - Cutler (2001) *Core Inflation in the UK* External MPC Unit Discussion Paper No. 3
- Weights based on ability to forecast inflation
  - Smith (2007) *Better Measures of Core Inflation*

II. Explaining inflation

Long-run and short-run determinants

Aggregate demand factors

Supply side factors

Monetary Factors

External Factors

Inflation Expectations

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Long-Run: The Quantity Theory of Money

- The price level is determined by the money supply
- The quantity equation: $Mv=pY$
- With constant velocity, changes in M are matched by changes in nominal GDP
- Under money neutrality, nominal variables have no effect on real variables, and the quantity of money determines the price level : classical dichotomy

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Is the quantity theory of money valid?

- Depends on validity of assumptions:
  - Money neutrality considered valid in the long run and changes in velocity are small in the long run
- Quantity theory works well when changes in monetary aggregates are very large relative to other disturbances in the economy, as is the case in periods of large monetary expansions
- But lower correlation in short run, and when inflation is low an stable as in the past 20 years

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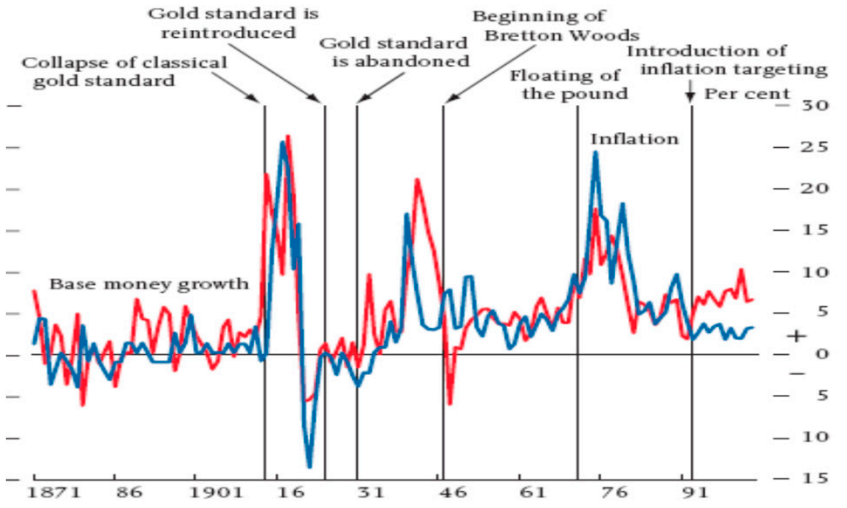
Chart 1
Inflation and money growth in the United Kingdom, raw data

(a) Composite price index[a] and M0 (annual rates of change)



(a) See O'Donoghue, Goulding and Allen (2004).

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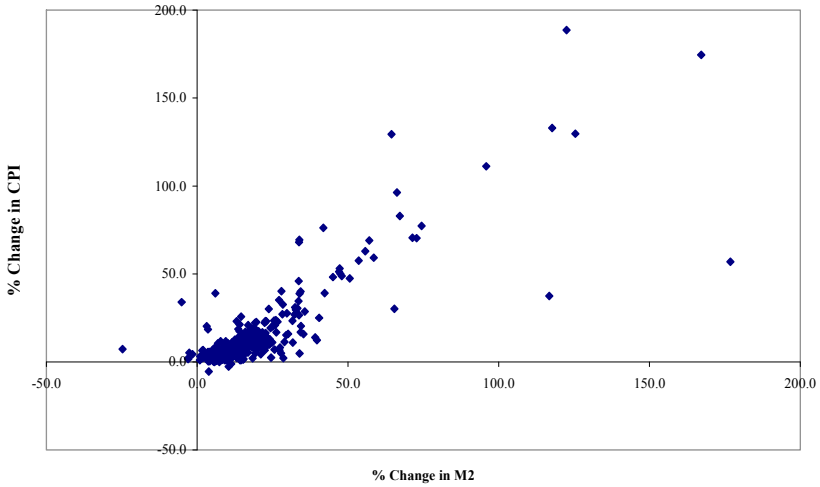
Figure 3. 2 Correlation between Money and Inflation



Source: Author's calculations. Data are the decadal (10-year) average growth rate in M2 and the 10 year average inflation rate from 1950 through 2000. Countries with inflation rates or money growth rates in excess of 200 percent are excluded. Data are from IMF *International Financial Statistics* and the sample includes all IMF member countries for which both data points were available for a total of 480 observations.

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Models of short-run inflation dynamics

- The Phillips curve model (PCM)
- The mark-up model
- Money market model
- Purchasing power parity model

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Phillips Curve Models

- A Phillips curve relates price or wage inflation to some measure of excess demand, either an unemployment, output or capacity utilization gap
- In the short run a fall in unemployment below the natural rate (or a positive output gap) imply higher inflationary pressures
- However, the trade-off is temporary, unemployment returns to its natural level (and output to potential) when agents adjust their inflation expectations

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Phillips Curve Models

- Besides the excess demand, a Phillips curve model includes:
  - **Inflation inertia:** The adjustment of inflation to excess demand can be sluggish, which is introduced by assuming a backward-looking behavior for inflation
  - **Speed-limit effects:** When y/u gap takes time to close. These are identified by introducing the change in y/u in the PCM, so that the y*/u* are affected by actual output or unemployment in the short run
  - **Supply shocks:** Oil prices, taxes or terms of trade can affect the y/u gap and inflation. This is captured by adding oil prices, wedges and the RER in the PCM

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Phillips Curve Models

- The Phillips curve model standard formulation is:

$$\pi_t = A(L)\pi^e_{t+1} + B(L)\pi_{t-1} + C(L)\left(U_t - U^*_t\right) + D(L)\left(y_t - y^*_t\right) + E(L)V_t$$

- Where A(L) is a forward polynomial, and B(L), C(L), D(L) and E(L) are lag polynomials

- Within this framework, different gap terms are seen as representing the impact of demand shocks, while supply shocks are captured by the terms in V_t

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Mark-up Models

- Mark-up models relate the price of final goods to their cost of production

$$p_t = \mu + \gamma ulc_t + (1-\gamma)\, pm_t + \xi_t$$

  - Prices driven by wage costs (unit labor costs) and costs of imported inputs (intermediate goods and energy), plus a mark-up equal to μ.

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Labor market productivity and ULC

- Labor market productivity
  - The ratio of the output of goods and services to the total labor hours devoted to the production of that output
- Unit labor cost (ULC) - Cost of labor per unit of output
  - ULC = total labor compensation / real output
  - ULC = hourly compensation / productivity

$$ULC = \frac{total\ labor\ compensation}{hours\ worked} / \frac{real\ output}{hours\ worked}$$

  - Thus, increases in productivity lower unit labor costs while increases in hourly compensation raise them. If both series move equally, unit labor costs are unchanged

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Money Market Models

- Disequilibria in the money market can have an impact on inflation:

$$m_t - p_t = \beta_0 + \beta_1 y_t + \beta_2 i_t + \xi_t$$

- Domestic output and the nominal interest rate affect the demand for real money balances.
- If the money supply does not fully adjust, the price level (and inflation) will adjust to restore to the equilibrium
- Also estimated as a long run relation to be incorporated into an error-correction model

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Purchasing Power Parity (PPP) Models

- The price level (and inflation) of tradable goods are linked by the purchasing power parity condition:

$$p_t = p_t^* + e_t$$

- By arbitrage, domestic prices of tradable goods can not deviate substantially from foreign prices expressed in local currency
- But PPP does not usually hold empirically

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Macroeconomic context: Demand side factors

- In general, we observe a positive correlation between aggregate demand and inflation
- What matters here:
  - the overall level of economic activity
  - the underlying sources of growth
  - the level of activity relative to potential output

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Macroeconomic context: Output and resource utilization

- Potential GDP
- Output gap
- Variables to look at:
  - Output and sectoral decomposition of output
  - Industrial production
  - Capacity utilization indicators
  - Unit labor costs
  - Profit margins
  - Unemployment rate
  - Labor productivity

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Macroeconomic context: Cost factors

- Variables to look at:
  - labor costs
  - Producer/wholesale prices
  - import prices
  - energy prices

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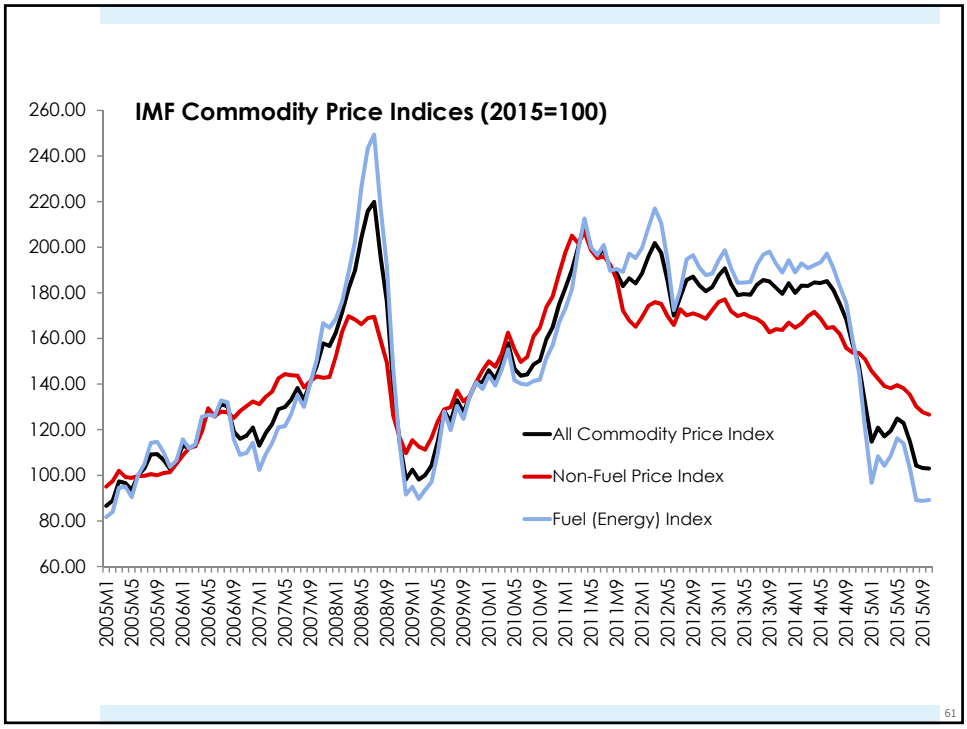
IMF Commodity Price Indices (2015=100)
260.00
240.00
220.00
200.00
180.00
160.00
140.00
120.00
100.00
80.00
60.00
All Commodity Price Index
Non-Fuel Price Index
Fuel (Energy) Index
2005M1
2005M5
2005M9
2006M1
2006M5
2006M9
2007M1
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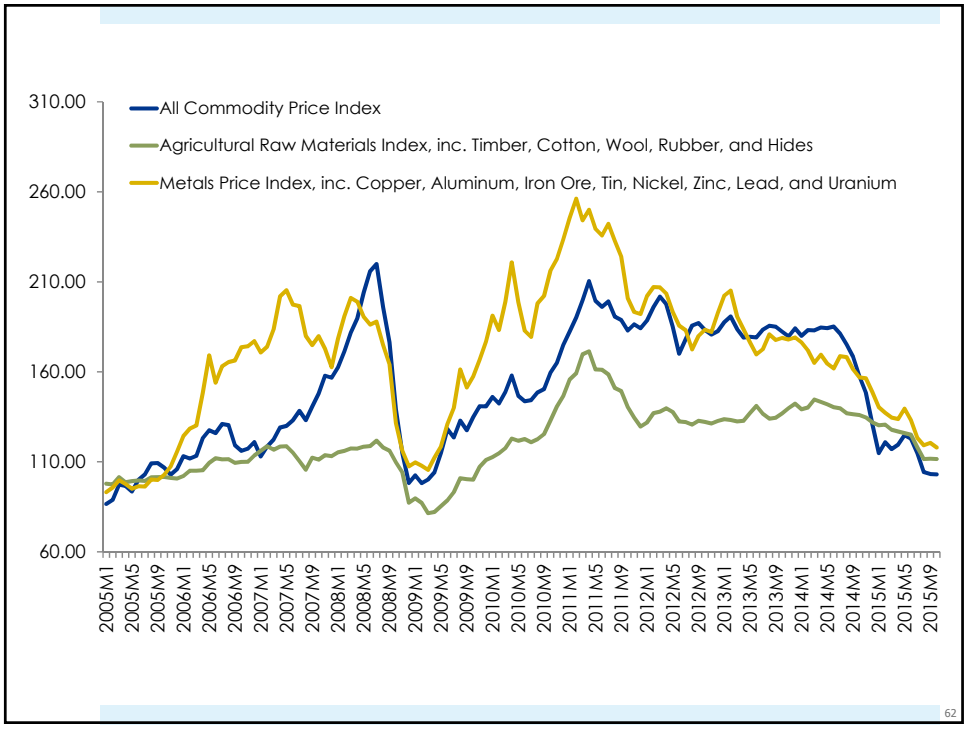
310.00
260.00
210.00
160.00
110.00
60.00
All Commodity Price Index
Agricultural Raw Materials Index, inc. Timber, Cotton, Wool, Rubber, and Hides
Metals Price Index, inc. Copper, Aluminum, Iron Ore, Tin, Nickel, Zinc, Lead, and Uranium
2005M1
2005M5
2005M9
2006M1
2006M5
2006M9
2007M1
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2012M1
2012M5
2012M9
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2014M1
2014M5
2014M9
2015M1
2015M5
2015M9
62

Inflation expectations

- Tend to be self-fulfilling
- Are determined by:
  - Recent inflation
  - Credibility of monetary policy
  - Credibility of fiscal policy
  - Exchange rates
- Are not observable

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- measured using two main sources:
  - Surveys
    - Households
    - Business
    - Official forecasters
    - Market participants
  - Financial data
    - Inflation indexed bonds
    - Term structure data (yields at different maturities)

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Forecasting Inflation

- ✓ Remain one of the most difficult variables to forecast.
- ✓ Stock and Watson (1999) use more than 100 variables to forecast inflation in the U.S. !!!

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Main Take Aways…

- The basket of goods used to calculate the CPI index is different in every country.
- Core inflation, excludes volatile CPI items such as food and energy, and is thus less volatile than CPI inflation.

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L-04. Analysis of Monetary and Fiscal Policy

Fazeer Rahim

Course on Macroeconomic Diagnostics
Dar es Salaam, Tanzania
November 30 - December 10, 2015

Overview

- Analysis of Monetary Policy
  - Introduction
  - Short-run indicators
  - The yield curve
  - Longer-term measures
- Analysis of Fiscal Policy
  - Measuring the fiscal stance
  - Effects of fiscal policy on aggregate demand
  - Fiscal policy and economic stabilization
  - Longer term measures of fiscal policy effects

Analysis of Monetary Policy

- Introduction
- Short-run indicators
- The yield curve
- Longer-term measures

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Introduction
Main Objectives of Monetary Policy Analysis

- What is the current stance of monetary policy?
- Is monetary policy too tight or too loose?
- What do inflation expectations and the yield curve imply about the future path of inflation?
- Is the path consistent with long-term stability in the nominal anchor?
- How strong is the commitment to the nominal anchor?

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Two Important Issues

- As one evaluates monetary policy, two important issues must be kept in mind:
  - What is the monetary policy regime – what is the central bank doing?
  - What is the transmission mechanism for this country?

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Issue #1: The Policy Regime

- The policy regime is the framework used by the monetary authorities to influence the evolution of macro variables
- The ***nominal anchor*** – the publicly-announced nominal variable that serves as the long-run target for monetary policy
  - E.g. Inflation, nominal exchange rate, money growth
- ***Instruments***
  - Open market operations, discount window, etc.
- ***Degree of commitment*** – is the framework transparent (easy to monitor)? Are the monetary authorities accountable for achieving stability?

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Issue #2: The Transmission Process (several possible channels of influence)

- Interest Rates
- Monetary Aggregates
- Credit Aggregates
- Exchange Rate
- Asset Prices

- Real GDP
- Price Level

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Analysis of Monetary Policy

- Introduction
- Short-run indicators
- The yield curve
- Longer-term measures

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Real Interest Rates

- The real interest rate is equal to the marginal rate of substitution between consumption today and consumption at a later period
- The real interest is also equal to the marginal cost of holding real money balances (rather than interest-bearing assets)

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Measuring Real Interest Rates

- The Fisher equation:

$$R_t \approx \rho_t + r_t + \pi_t^e$$

where

R_t = nominal interest rate
ρ_t = risk premium
r_t = real interest rate
π_t^e = expected rate of inflation

- Or: $r_t \approx R_t - \rho_t - \pi_t^e$
- *The risk premium and inflation expectations are not directly observable*

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- Inflation expectations measures
  - Surveys market participants, or households
  - Inflation-indexed bonds to infer expectations,
  - Estimate inflation expectations
    - All these approaches have limitations
- Risk premium
  - Likely to be counter-cyclical
    - for example, increasing when there is uncertainty about future economic activity and the inflationary effects of loose monetary policy
  - But most approaches assume it constant over time

    Can be estimated as average over a longer period of time

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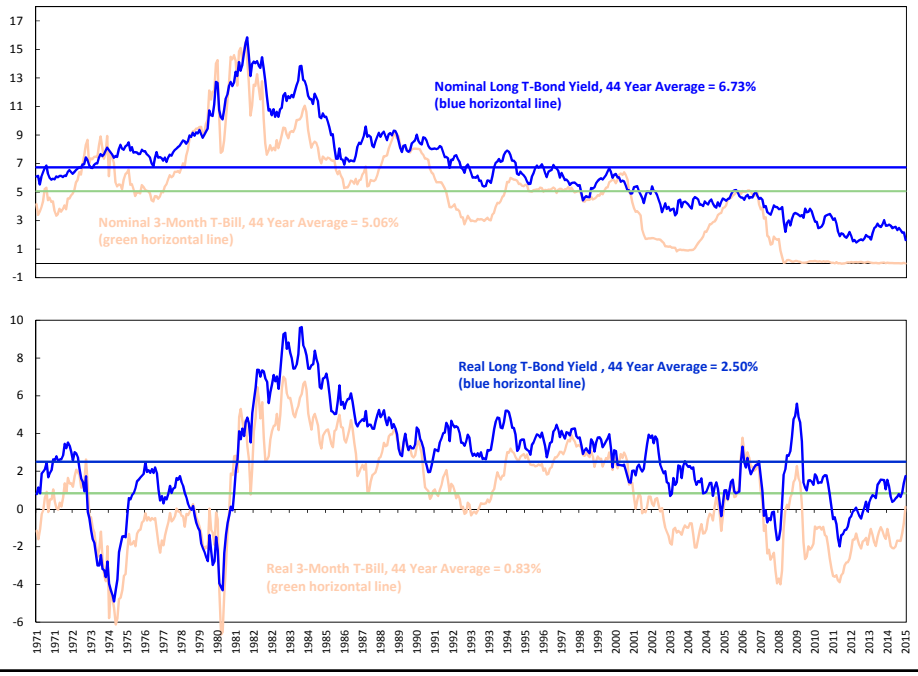
U.S. Real Interest Rates, 1971-2015



Real Interest Rates and Tightness of Monetary Policy

- Real interest rates in the U.S. have become negative, indicating a loose monetary policy stance
- But, are they too loose or not loose enough?
- Need to benchmark the real rate against measures of future economic activity and inflation
- In addition, with the normal transmission mechanism impaired, the real interest may be having no effect on current economic activity

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Monetary Policy Stance and Taylor's Rule

- Taylor (1993) suggested an interest rate rule relating the federal funds rate (R_t) to deviations between inflation (π^e_t) and output (y_t) and their long-term or target values (π^* and y^*):

$$R_t = \pi + a_p(\pi_t - \pi^*) + a_y(y_t - y^*)$$

- which quickly changed to, and other versions (see Carare and Tchaidze IMF WP 05/148):

$$R_t = r^* + \pi + a_p(\pi^e_t - \pi^*) + a_y(y_t - y^*)$$

- In practice, the difficulties with this rule are:
  - place a value on the steady state real interest rate,
  - obtain a measure of potential output, and
  - assign weights to the reaction functions

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Taylor Rule: $R_t = \pi + a_p(\pi_t - \pi^*) + a_y(y_t - y^*)$

- In order for real rates to increase when inflation is above the target, $a_p>1$
- In order for real rates to increase when the output gap is positive $a_y>0$,
  - strict inflation targeting countries would set this parameter to zero
  - but as Bank of England governor King pointed out in 1997, there are not inflation nutters out there (meaning central banks look at other variables too)
- *Taylor found that U.S. monetary policy is well-captured by $a_p=1.5$ and $a_y=0.5$, when $\pi^*=2\%$, and $r^*=2\%$*

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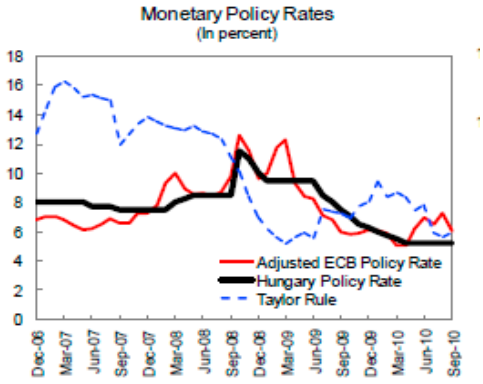
Monetary Policy Stance in Hungary, 2007-10



Source: NBH, WEO, and Fund staff estimates.
Note: Adjusted ECB Policy Rate is computed as the ECB main refinancing facility rate plus the spread between German and Hungarian 5-year government bonds, each in their domestic currencies. The Taylor rule assigns equal weights of 0.5 to inflation and output gap, with expected inflation proxied by average inflation over the previous four quarters, and the equilibrium real interest rate proxied by the average real GDP growth over 1995-2010.

Source: Hungary: Ex Post Evaluation of Exceptional Access Under the 2008 Stand-By Arrangement , June 21 2011, IMF Country Report 11/145

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Monetary Aggregates

- The instability in money demand tends to undermine the predictive potential of monetary aggregates and therefore limits their use
- Monetary aggregates can be informative in certain circumstances, and base money is sometimes used as a nominal anchor in situations of limited financial development or limited policy credibility
- The ECB uses a reference range for money growth, while the US Federal Reserve focuses almost entirely on credit channels and interest rates
- Other short run indicators for the monetary policy stance measures are comprised by different variations of the Monetary Conditions Index

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Analysis of Monetary Policy

- Introduction
- Short-run Indicators
- The yield curve
- Longer-term Measures

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What is the Yield Curve?

- The yield curve is the relationship between the nominal interest rate and the time to maturity for a given type of debt
- Only specific points on the curve are known with some degree of certainty. The rest of the curve must be interpolated
- Specific points can be identified using auction rates, secondary market rates, forward rates, and swap rates

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- Yield curve tends to slope upward in "normal" times, reflecting increasing risk with longer-maturity investments
- As a practical matter, however, we can generally assume that **changes in short term yields are dominated by monetary policy,** or expectations of a change in monetary policy, since inflation responds with a lag to monetary policy
- **Changes in longer-term rates likely reflect changes in inflation expectations**, since reasonable forecasts would assume a normalization of real interest rates

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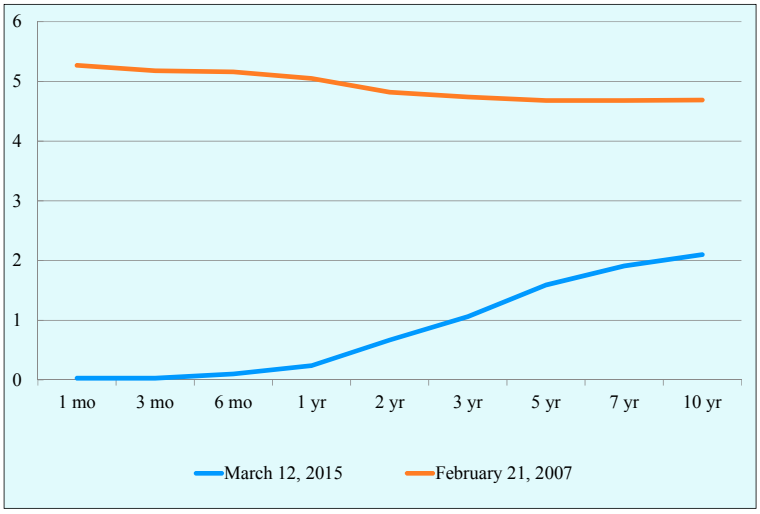
Yield Curve for US government bonds (source US Treasury)



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Analysis of Monetary Policy

- Introduction
- Short-run indicators
- The yield curve
- Longer-term measures

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Is the Monetary Policy Regime Credible?

- Credibility is difficult to measure and assess
- Need high-quality, forward-looking data (interest rates, exchange rates, inflation expectations) in order to determine whether central banks are doing what they say they are doing

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Quantity Theory of Money

- The relative form of the quantity theory of money links money growth (m) and output growth (g)
- If the price index and the velocity of money are constant, it shows that **g=m**
- *Otherwise, printing more money than the real economic growth implies brings only inflation in the long run*

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Fiscal Policy

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Instant poll #1

Fiscal policy…

A. …is a short-run stabilization tool

B. …is a long-run stabilization tool

C. …can be used to stabilize the economy in both short and long run

D. …should not be used for stabilization as it would increase the national debt

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Analysis of Fiscal Policy

- The fiscal stance
- Fiscal policy and AD
- Economic stabilization
- Long term effect of fiscal policy (AS)

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Stylized Fiscal Accounts

Total Revenues and grants	**T**
Revenues	
-Current	
Tax	
Non Tax	
-Capital	
Grants	
Total expenditures and net lending	**G**
Primary Expenditures	
-Current	
Wages and salaries } →	***Cg***
Goods and Services	
Other current expenditures	
- Capital →	***Ig***
Interest Payments	**iD**
Overall Balance	**BAL = ΔD = T – G**

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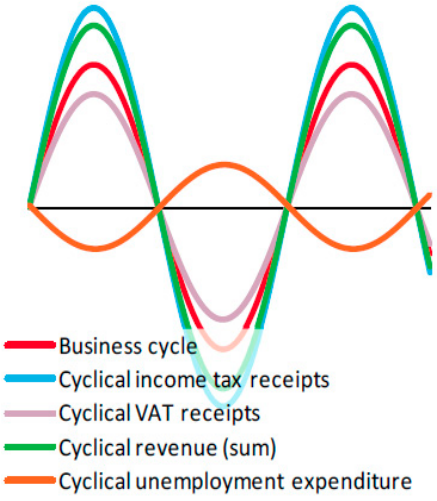
G, T and BAL are Misleading Measures of Fiscal Policy

- Some fiscal variables respond automatically to temporary changes in output
- For example, when the output gap is negative:
  - Unemployment benefits are higher than usual
  - Income from HHs and corporations are lower and, therefore, most tax revenues are lower
  - Revenues from taxes on capital gains and property are also likely to be lower
  - If the tax system is progressive, overall tax revenues will also be lower



95

- Automatic stabilizers can be an important part of managing aggregate demand
- However, automatic stabilizers are temporary by definition, and they are not as important for understanding "structural" issues:
  - The importance of discretionary policy
  - The fiscal burden or the size of government
  - The role of public investment
  - Fiscal sustainability

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Cyclical Balance

The cyclically adjusted balance
is
the overall balance adjusted for the cycle

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Decomposing the Cyclical Balance

- Balance:

$$b^* = [\,(\sum_{i=1}^{4} T_i^*) - G^* + X]\,/Y^*$$

where
b* = cyclically-adjusted balance
G* = cyclically-adjusted current government primary expenditure
X = non tax revenue minus capital and net interest spending
Y* = level of potential output

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Decomposing the Cyclical Components

- Taxes:

$$T_i^*/T_i = (Y^*/Y)^{\varepsilon_{t_i,y}}$$

where
T^*_i = cyclically-adjusted component of the *i* th category of tax
T_i = actual tax revenue for the *i* th category of tax
Y* = level of potential output
Y = level of actual output
$\varepsilon_{t\ i,y}$ = elasticity of the *i* th category of tax with respect to the output gap

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Decomposing the Cyclical Components

- Expenditures:

$$G^*/G = (U^*/U)^{\varepsilon_{g,u}}$$

where
G*= cyclically-adjusted government primary expenditures
G = actual current primary government expenditures (excluding capital and interest spending)
U* = level of structural unemployment
U = level of actual unemployment
$\varepsilon_{g,y}$ = elasticity of current government primary expenditures with respect to the ratio of structural to actual unemployment

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Decomposing the Cyclically-Adjusted Balance

- It follows that the balance becomes:

$$b^* = [\,(\sum_{i=1}^{4} T_i\,(Y^*/Y)^{\varepsilon_{t_i,y}}) - G\,(U^*/U)^{\varepsilon_{g,u}} + X\,]\,/Y^*$$

The detailed methodology is presented in Girouard and André (2005), "Measuring cyclically-adjusted budget balances for OECD countries", Economics Department Working Paper No.434

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Summary of elasticities

	Corporate tax	Personal tax	Indirect tax	Social security contributions	Current expenditure	Total balance
United States	1.53	1.30	1.00	0.64	-0.09	0.34
Japan	1.65	1.17	1.00	0.55	-0.05	0.33
Germany	1.53	1.61	1.00	0.57	-0.18	0.51
France	1.59	1.18	1.00	0.79	-0.11	0.53
Italy	1.12	1.75	1.00	0.86	-0.04	0.53
United Kingdom	1.66	1.18	1.00	0.91	-0.05	0.45
Canada	1.55	1.10	1.00	0.56	-0.12	0.38
Australia	1.45	1.04	1.00	0.00	-0.16	0.39
Austria	1.69	1.31	1.00	0.58	-0.08	0.47
Belgium	1.57	1.09	1.00	0.80	-0.14	0.52
Czech Republic	1.39	1.19	1.00	0.80	-0.02	0.39
Denmark	1.65	0.96	1.00	0.72	-0.21	0.59
Finland	1.64	0.91	1.00	0.62	-0.18	0.48
Greece	1.08	1.80	1.00	0.85	-0.04	0.47

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Summary of elasticities

	Corporate tax	Personal tax	Indirect tax	Social security contributions	Current expenditure	Total balance
Hungary	1.44	1.70	1.00	0.63	-0.03	0.47
Iceland	2.08	0.86	1.00	0.60	-0.02	0.37
Ireland	1.30	1.44	1.00	0.88	-0.11	0.38
Korea	1.52	1.40	1.00	0.51	-0.04	0.22
Luxembourg	1.75	1.50	1.00	0.76	-0.02	0.47
Netherlands	1.52	1.69	1.00	0.56	-0.23	0.53
New Zealand	1.37	0.92	1.00	0.00	-0.15	0.37
Norway (mainland)	1.42	1.02	1.00	0.80	-0.05	0.53
Poland	1.39	1.00	1.00	0.69	-0.14	0.44
Portugal	1.17	1.53	1.00	0.92	-0.05	0.46
Slovak Republic	1.32	0.70	1.00	0.70	-0.06	0.37
Spain	1.15	1.92	1.00	0.68	-0.15	0.44
Sweden	1.78	0.92	1.00	0.72	-0.15	0.55
Switzerland	1.78	1.10	1.00	0.69	-0.19	0.37
OECD average	1.50	1.26	1.00	0.71	-0.10	0.44
Euro area average	1.43	1.48	1.00	0.74	-0.11	0.48
New EU members average	1.38	1.15	1.00	0.71	-0.06	0.42

Note: The last column is the semi-elasticity which measures the change of the budget balance, as a per cent of GDP, for a 1% change in GDP. It is based on 2003 weights. Aggregate country zone averages are unweighted.
Source: OECD Economic Outlook 76 database and OECD estimates.

Other Adjustments

- Some one-off adjustments to taxes or expenditures might be warranted:
  - For example, might want to remove unusual revenues associated with an asset boom (in the housing or stock markets)
  - A sale of a large asset (most common example is the year in which the telecom or wireless licenses are sold)
  - A change in tax collection deadlines might push some revenues into the next year

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Measures of Fiscal Policy

- Fiscal ***stance*** – the structural budget balance which is the cyclically-adjusted fiscal balance plus any one-offs
- Fiscal ***impulse*** – the change in the structural balance
- Fiscal ***effect*** – the economic effect of changes in taxes and expenditures, allowing for the lagged effects of fiscal policy

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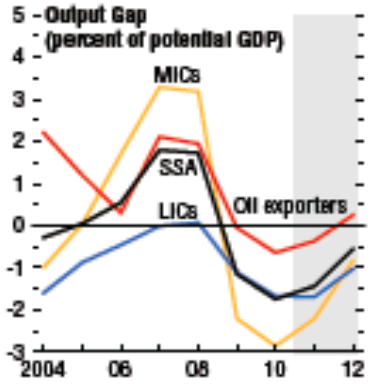
Fiscal Indicators in Low Income Countries

- WEO calculates output gap using a filter, for Sub-Saharan Africa and LIC countries



Source: World Economic Outlook, April 2011

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Fiscal Indicators in Low Income Countries

- In general overall balance excluding grants is the most used indicator in Sub-Saharan Africa
- Another useful indicator is the non-oil primary balance, for resource rich countries

Table 1. Nigeria: Selected Economic and Financial Indicators, 2007–13

				Projections			
	2007	2008	2009	2010	2011	2012	2013
	Percent of GDP, unless otherwise stated						
Consolidated government operations							
Total revenues and grants	28.4	32.8	19.9	25.5	26.6	25.9	24.8
Of which: oil and gas revenue	21.9	26.6	13.0	19.0	20.2	19.4	18.0
Total expenditure and net lending	28.7	28.2	30.4	32.3	27.0	25.2	24.6
Overall balance	-0.4	4.6	-10.4	-6.9	-0.4	0.7	0.2
Non-oil primary balance (percent of non-oil GDP) [2]	-29.1	-28.4	-27.3	-32.2	-24.9	-21.4	-19.0
Excess Crude Account / Sovereign Wealth Fund (US$ billions) [3]	14.2	19.7	7.1	3.4	15.2	28.6	42.0

Source: Nigeria, 201o Staff report, IMF Country report 11/57

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Analysis of Fiscal Policy

- The fiscal stance
- Fiscal policy and AD
- Economic stabilization
- Long term effects of fiscal policy (AS)

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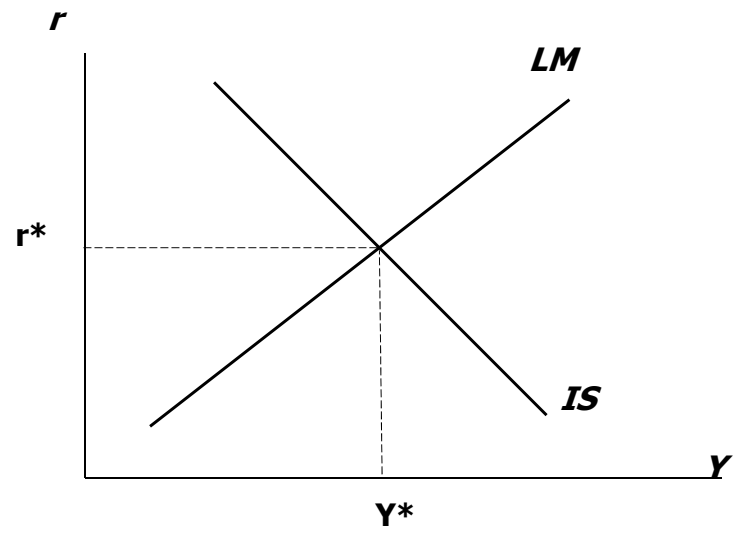
A Review of the IS-LM Model



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The IS Curve

- The IS curve maps out the *negative* relationship between the real interest and real income in the *goods* market

$$Y = C(Y - \bar{T}) + I(r) + \bar{G}$$

- As the real interest increases, demand for investment goods falls, causing total aggregate demand to fall
- Changes in G or T will ***shift*** the IS curve (holding the real interest rate unchanged)

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Effects of *G* on the IS Curve

$$Y = C(Y - \bar{T}) + I(\bar{r}) + G$$

$$\Delta Y = \Delta C + \Delta G$$

$$\Delta Y = \text{MPC} \times \Delta Y + \Delta G$$

Solve for ΔY:

$$\Delta Y = \left(\frac{1}{1 - \text{MPC}}\right) \times \Delta G$$

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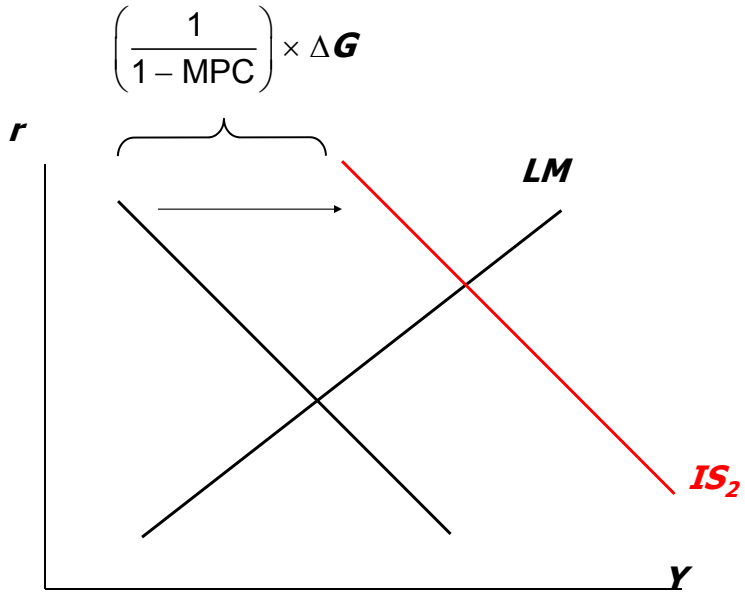

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Effects of ΔT on IS Curve

$$Y = C(Y - T) + I(\bar{r}) + \bar{G}$$

$$\Delta Y = \text{MPC}\,(\Delta Y - \Delta T)$$

$$\Delta Y = \text{MPC} * \Delta Y - \text{MPC} * \Delta T$$

Solve for ΔY:

$$\Delta Y = \left(\frac{-\text{MPC}}{1 - \text{MPC}}\right) \times \Delta T$$

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Why the IS Curve Might Shift by Less

- First, we are ignoring the external sector
  - Some of the increase in income is likely to be spent on foreign goods, reducing the effects on aggregate demand
  - Also, the fiscal stimulus is likely to push up interest rates, leading to an ER appreciation (lowering exports and further increasing imports)
- Second, Ricardian equivalence….

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Ricardian Equivalence

- Ricardian equivalence has strong implications, which do not appear to hold in the real world
- The government faces an intertemporal budget constraint:

$$G + \frac{G'}{1+r} = T + \frac{T'}{1+r}$$

- Thus, an increase in G today, requires that the government lower G in the future (G'), or raise taxes in the future (T')

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- If consumers fully understand this, they will save some of the increase in G, in order to smooth out their consumption over time
- Why might Ricardian equivalence not hold?
  - **Consumers are myopic** – do not understand the implications for future government actions
  - **Consumers are credit-constrained** – if some consumers do not have access to credit markets, the extra income today might reduce this constraint
  - **Consumers have finite lives** – future government policy changes might not happen in their lifetimes

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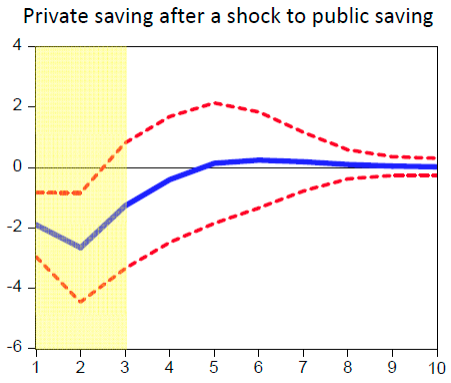
Ricardian evidence: Mexico

- The impulse response of private saving to a shock inpublic saving is one for one

→ perfectly Ricardian

- It takes 3 years to for private saving to recover

from gov't dissaving shock



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The LM Curve

- The LM curve traces out the *positive* relationship between the real interest and real income in the *money* market
- As income increases, the demand for real money balances increases, putting upward pressure on the real interest rate
- Changes in the price level will ***shift*** the LM curve

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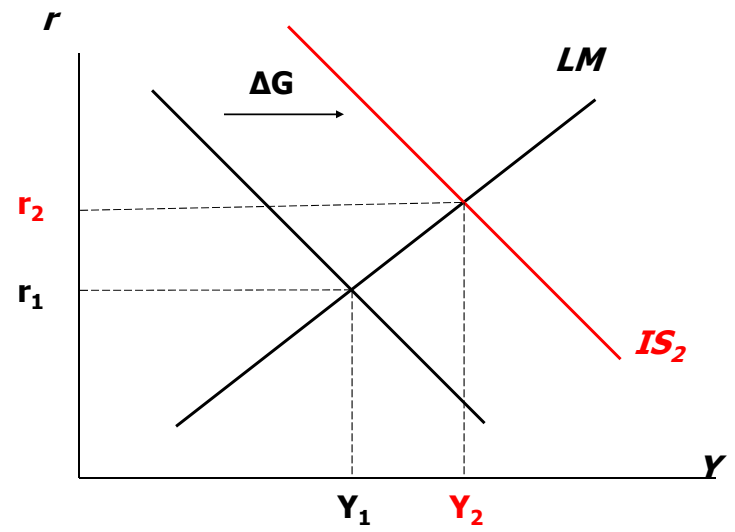

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Instant Poll #2

In my country we assume that the expenditure multiplier is

A. …bigger than 1

B. …smaller than 1

C. …about 0

D. We don't care – there's no multiplier in my country

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Estimates of Fiscal Policy Multipliers

from the DRI Macroeconometric model

Assumption about monetary policy	**Estimated value of $\Delta Y/\Delta G$**	**Estimated value of $\Delta Y/\Delta T$**
Fed holds money supply constant	0.60	–0.26
Fed holds nominal interest rate constant	1.93	–1.19

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Analysis of Fiscal Policy

- The Fiscal Stance
- Fiscal Policy and AD
- Economic Stabilization
- Fiscal Policy and AS

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The Importance of Automatic Stabilizers

- The most important factor determining the cyclical sensitivity of the fiscal position is the *size of the general government sector*
- The tax structure is also important: The greater the taxation of cyclically-sensitive tax bases, the more cyclical revenues will be
- Other factors: the generosity of transfer incomes, and the progressivity of the tax system

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Sustainability Issues

- To be sustainable, countercyclical policy must be **symmetric**
  - An increase in expenditures during a recession must be offset with a decrease in tomorrow's boom
  - The same holds true for a tax cut during today's recession.
- Procyclical policy: overspending that hinders countercyclical policy in the future

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One Final Issue Related to Sustainability

- A fiscal stance of zero would align spending and taxes one-to-one
- Does an intended fiscal stance of zero imply sustainability?
  - Perhaps, but your debt may drift upwards, depending on the growth rate of the economy, the stock of debt, and the interest rate for this debt (see tomorrow's lecture)

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Analysis of Fiscal Policy

- The fiscal stance
- Fiscal policy and AD
- Economic stabilization
- Long term effect of fiscal policy (AS)

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Neoclassical View on Public Investment

- The stock of public-sector capital is calculated just the private sector capital stock
- Public capital is *complementary* to stock of private capital
- This approach ignores
  - other types of capital services, such as education and health
  - the possibility that public capital might "crowd in" or "crowd out" private capital
  - no consideration is given to how public spending is financed

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Overview

- Analysis of Monetary Policy
  - Short-run indicators
    - real interest rates, Taylor rule, monetary aggregates, etc
  - The yield curve
  - Longer-term measures
- Analysis of Fiscal Policy
  - Measuring the fiscal stance
    - Cyclically adjusted balance, structural balance, etc
  - Effects of fiscal policy on aggregate demand
  - Fiscal policy and economic stabilization
  - Longer term measures of fiscal policy effects

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Main takeways

- The quantity theory of money links money growth (m) and output growth (g)

  If the price index and the velocity of money are constant, it shows that **g=m**

- A negative real interest rate means that **monetary policy is loose**

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Main takeways

- Ricardian equivalence might not hold because
  - Consumers are **credit constrained**
  - Consumers have **finite lives**
  - Consumers are **myopic**

- The cyclically adjusted balance is **the overall balance adjusted for the cycle**

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L-5. Fiscal Sustainability

Irina Yakadina

Course on Macroeconomic Diagnostics (OT 15.14)
Dar Es Salaam, Tanzania
November 30–December 10, 2015

Outline

- Motivation
- How Much Debt is Too Much?
- Debt Dynamics
- Assessing Fiscal Sustainability

2

Motivation

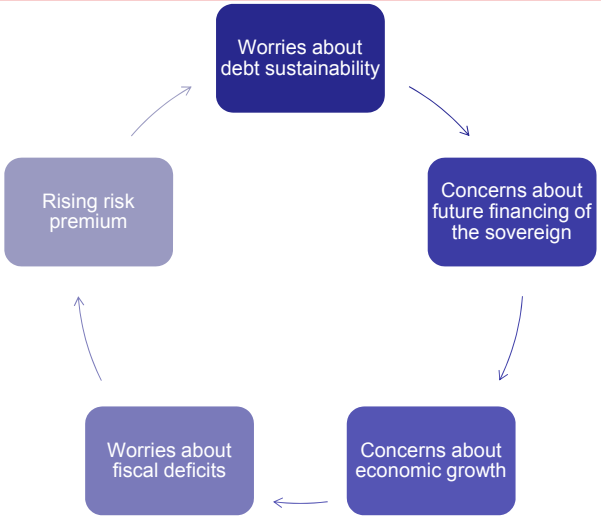
3

Motivation

- Three Simple Questions
  - Why do budget deficits matter?
  - Why does the financing of the deficit matter?
  - How big should the deficit be?
- No simple answers
  - The “key” is sustainability
  - Why is sustainability analysis important?

4

Vicious Circle of Deficit & Debt



5

Budget Deficit Financing

- Financing = Internal + External sources

Internal sources:

- ✓ Borrowing from the central bank
- ✓ Borrowing from the rest of the banking system
- ✓ Borrowing from the domestic nonbank sector

External sources:

- ✓ Borrowing from abroad
- ✓ Running down foreign reserves

6

What is Meant by Sustainability

- Can the current policy strategy be maintained without running up against constraints related to net borrowing of the fiscal authorities
  (fiscal sustainability)
- The perspective is related to financial constraints, not the optimality of policy
- Sustainability usually means solvability
- Sustainability does not mean liquidity, nor optimality

7

How Do We Make Sustainability Concept Operational?

- Technical definition difficult to apply as the authorities' strategy can entail changing policies over time
- Adopt more pragmatic approach, projecting debt forward on the basis of current policies
- Borrower will not need to make unrealistic adjustments to policies to avoid a crisis

8

Why is Sustainability Analysis Important?

- Assessment of government's ability to borrow
- Prediction of onset of fiscal crisis
- Assessment of fiscal risks associated with government and quasi-government contingent liabilities
- Assessment of the prior fiscal policy record
- Discussion of future fiscal policy choices

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How Much Debt is Too Much?

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Costs of Excessive Debt

- Growth
  - Debt overhang → a rise in interest rates and erosion of confidence
  - Reduced investment & growth
- Fiscal
  - Rising debt service
  - Rising tax burden for debt service creates distortions
  - Disincentive to correct Fx rate
- Financial
  - Borrowing rates rise because of risk premium
  - Vulnerability to speculation
  - Risks to financial stability

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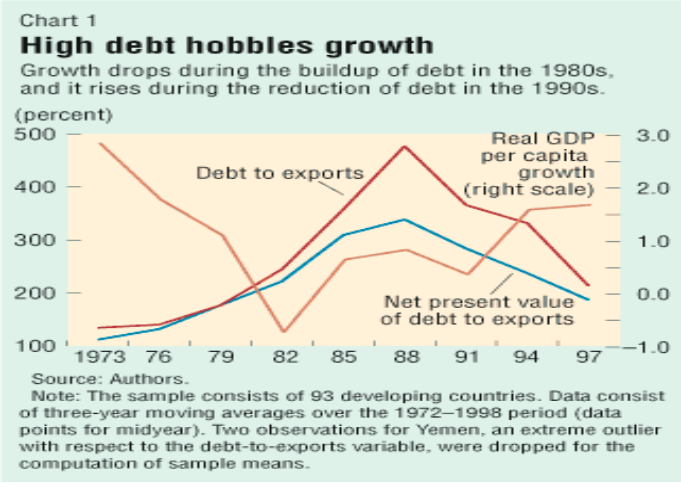
''Beyond certain levels, additional indebtedness may reduce growth''



Source: Pattillo et al. (2002), *Finance & Development*, June 2002, Volume 39, No. 2, IMF

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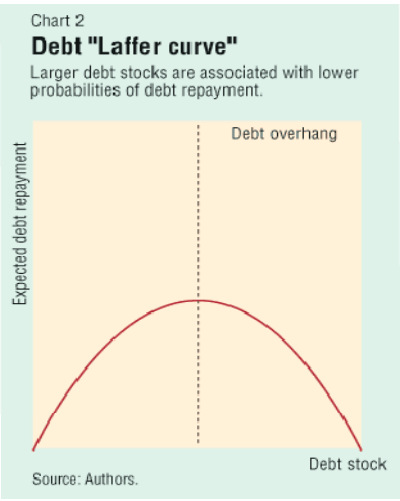
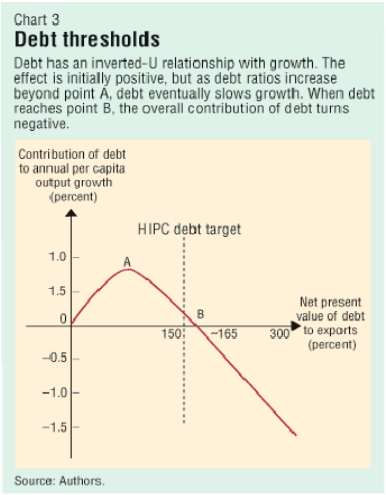
Debt Laffer curve and Debt Tresholds





Source: Pattillo et al. (2002), *Finance & Development*, June 2002, Volume 39, No. 2, IMF

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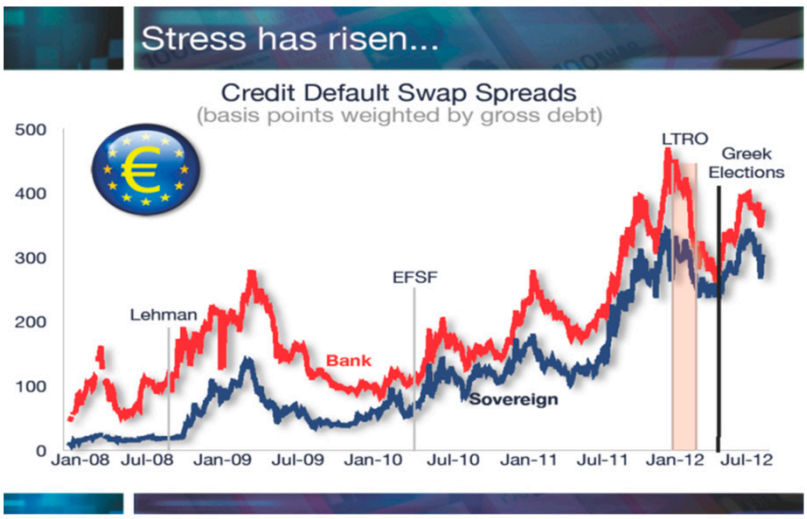
Lessons from the Euro Area Crisis



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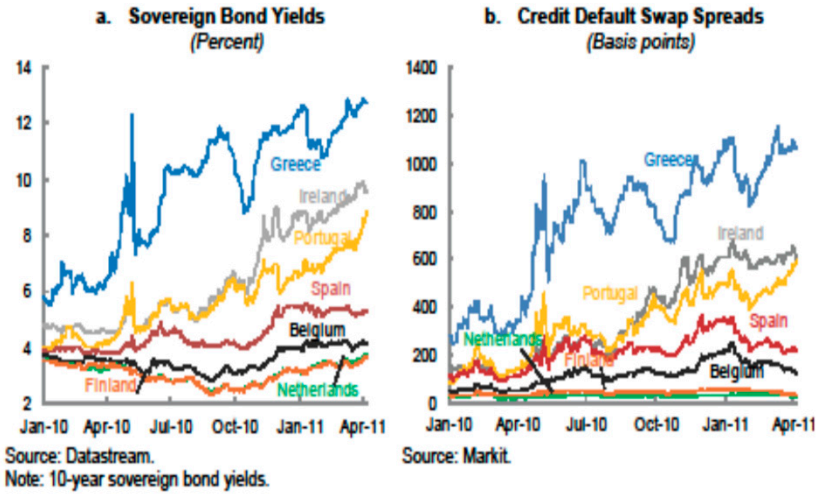
An increased dispersion in yields within Europe



Source: Datastream.
Note: 10-year sovereign bond yields.

Source: Markit.

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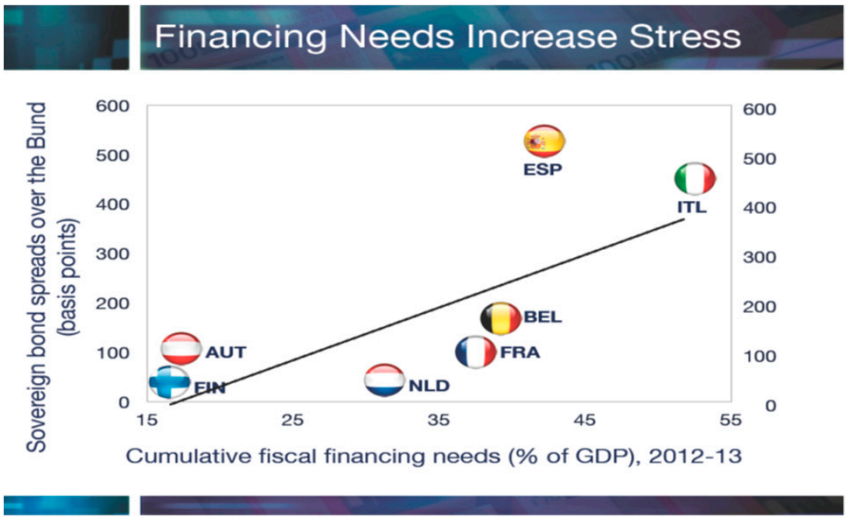
Lessons from the Euro Area Crisis (cont.)



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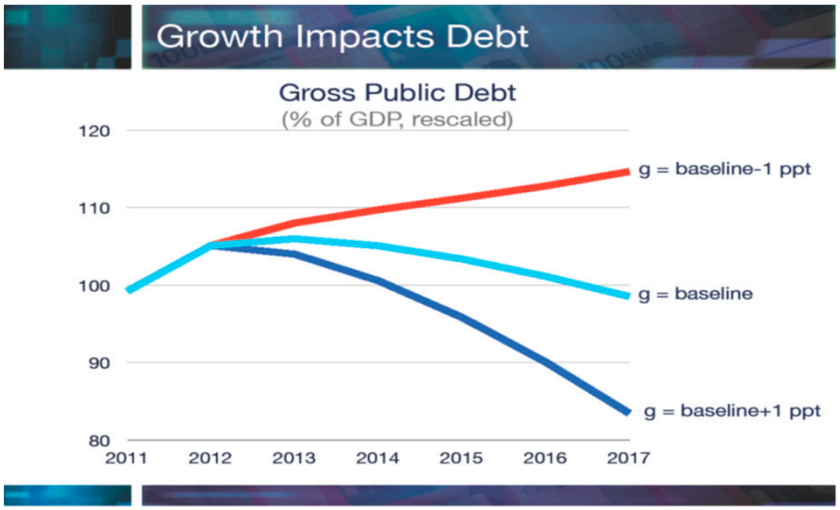
Lessons from the Euro area (cont.)



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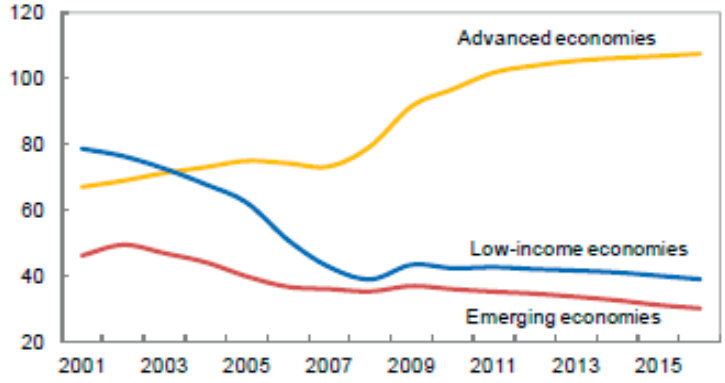
Debt levels are relatively low in LICs and EMs economies on average, but…

Figure 1.11. General Government Gross Debt Ratios

(Percent of GDP; 2009 PPP-GDP weighted averages)



Sources: IMF staff estimates and projections.

IMF Global Fiscal Monitor, April 2011

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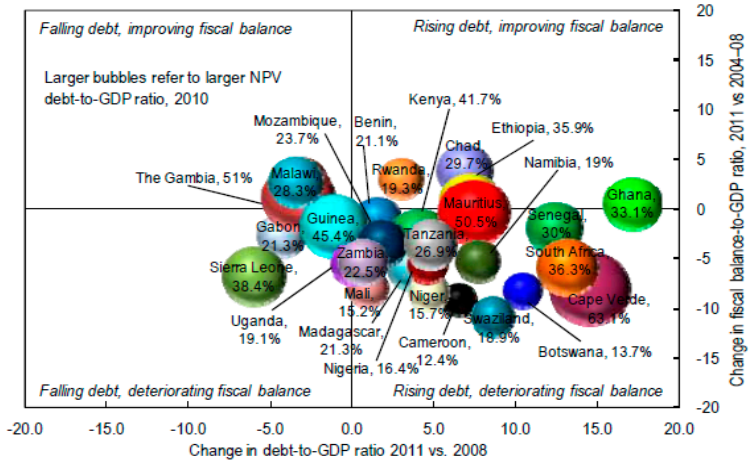
…the accomodative fiscal policy stance over the past few years has led to rising debt ratios in a number of countries.

Figure 1.11. Sub-Saharan Africa: Change in Fiscal Balance and Net Present Value of Public Debt[1]



Sources: IMF, *World Economic Outlook;* and IMF staff calculations.

[1]For Botswana, Gabon, Mauritius, Namibia, Nigeria, South Africa, and Swaziland, data are nominal public debt.

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Debt Dynamics

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Analytical Framework

- Analytical solvency condition
- Is debt process explosive?
- How to stabilize debt?
- What is the role of monetary financing? (see Appendix)
- What is the role of external financing? (see Appendix)

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Notation

D_t	stock of debt	$D_t = D_{t-1} + \Delta D_t$
PB_t	primary or non-interest surplus	$\Delta D_t = iD_{t-1} - PB_t$
r_t	real interest rate	
π_t	inflation rate	
g_t	real GDP growth rate	
P_tY_t	nominal GDP	$P_tY_t = (1+\pi_t)(1+g_t)P_{t-1}Y_{t-1}$
i_t	nominal interest rate	$(1+i_t) = (1+\pi_t)(1+r_t)$

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Intertemporal Budget Constraint

- Intertemporal budget constraint (t=2)

$$D_1 = (1+i)D_0 - PB_1$$

$$D_2 = (1+i)D_1 - PB_2$$

$$= (1+i)\underbrace{\left((1+i)D_0 - PB_1\right)}_{=D_1} - PB_2$$

$$D_2 = (1+i)^2 D_0 - (1+i)PB_1 - PB_2$$

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Solvency Condition

- Intertemporal budget constraint (t=N)

$$D_N = (1+i)^N D_0 - \sum_{j=1}^{N}(1+i)^{N-j} PB_j$$

- By dividing both sides by $(1+i)^N$ and putting D_0 on the other side, we have the following expression:

$$D_0 = \sum_{j=1}^{N}\left(\frac{1}{1+i}\right)^j PB_j + \left(\frac{1}{1+i}\right)^N D_N$$

  - Solvency $\rightarrow D_N = 0$, current debt equal to the present value of future primary balances

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Law of Motion: the Debt-to-GDP Ratio

- Government Debt at time t

$$D_t = (1+i_t)D_{t-1} - PB_t \qquad (1)$$

- By dividing eqn.(1) by nominal GDP, P_tY_t

$$\underbrace{\frac{D_t}{P_tY_t}}_{d_t} = \frac{(1+i_t)}{(1+\pi_t)(1+g_t)}\underbrace{\frac{D_{t-1}}{P_{t-1}Y_{t-1}}}_{d_{t-1}} - \underbrace{\frac{PB_t}{P_tY_t}}_{pb_t}$$

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Debt Dynamics

- Evolution of the debt-to-GDP ratio

$$d_t = \phi_t d_{t-1} - pb_t \qquad (2)$$

where $\phi_t = \dfrac{(1+i_t)}{(1+\pi_t)(1+g_t)} = \dfrac{(1+r_t)}{(1+g_t)}.$

- If $\phi_t < 1$ or $r_t < g_t$ then d_t converges, and debt is sustainable
- If $\phi_t > 1$ or $r_t > g_t$ then d_t explodes

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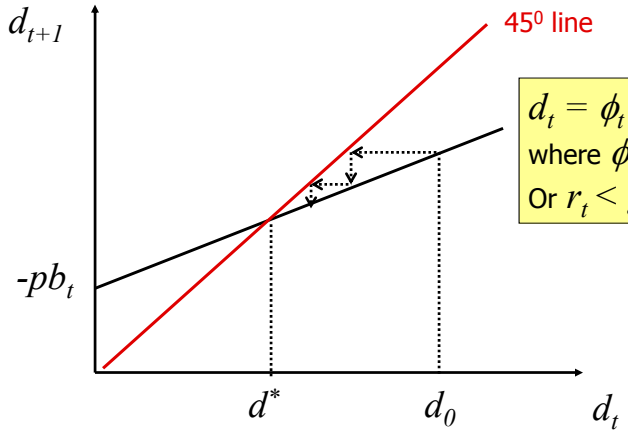
Stable/Sustainable Debt Dynamics



$d_t = \phi_t d_{t-1} - pb_t$
where $\phi_t < 1$
Or $r_t < g_t$

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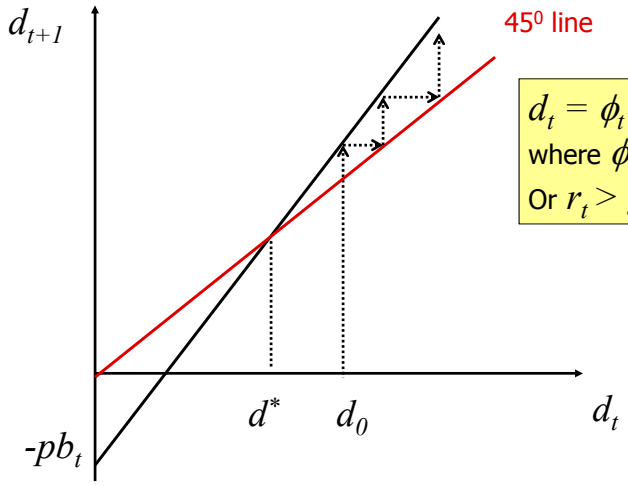
Explosive Debt Dynamics



$d_t = \phi_t d_{t-1} - pb_t$
where $\phi_t > 1$
Or $r_t > g_t$

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How Could We Stabilize Debt?

- By subtracting d_{t-1} from both sides of (2), one gets:

$$\Delta d_t = (\phi_t - 1) d_{t-1} - pb_t. \qquad (3)$$

- To stabilize d_t we need $\Delta dt = 0$. That is,

$$pb_t = (\phi_t - 1) d_{t-1} \; where \; (\phi_t - 1) = \frac{r_t - g_t}{1 + g_t}.$$

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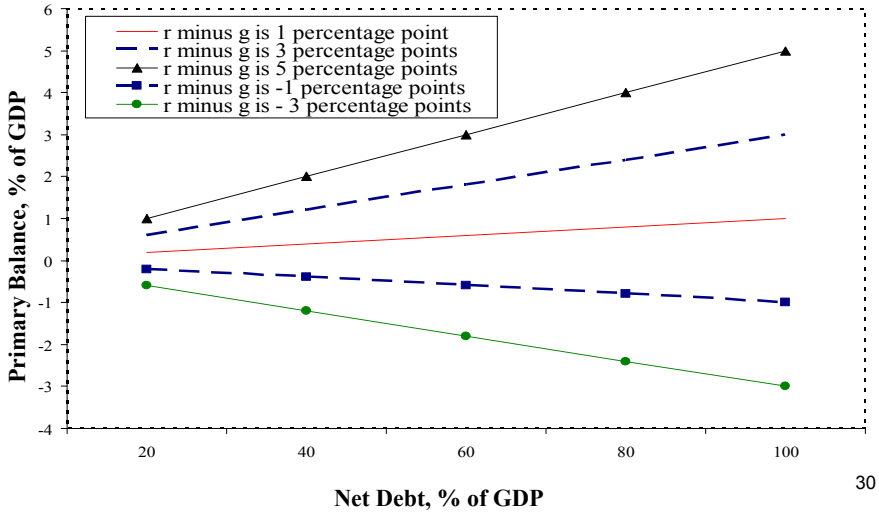
Primary Balance Needed to Stabilize Debt for Different Levels of *r* relative to *g* (with zero seigniorage)



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PB Needed to Stabilize the Debt-to-GDP Ratio

$$pb_t = \left(\frac{r_t - g_t}{1+g_t}\right) d_{t-1} - \mu m_t$$

$$\approx \left(\frac{r_t - g_t}{1+g_t}\right) d_{t-1} - \frac{\pi + g}{v}.$$

Key results:

- the lower is the target inflation, the larger is the primary surplus needed to stabilize the debt-to-GDP ratio;
- the larger the gap between the real interest rate and real growth, the higher is the required primary surplus for the same level of inflation;
- the higher the stock of debt, the higher is the required primary surplus.

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The Impact of Shocks

- Debt sustainability analysis focuses on the evolution of the debt-to-GDP ratio with unchanged policies and parameters (growth and interest rates)
- However, the future is uncertain and economies are often hit by shocks
- It is important to look at the consequences of those shocks on debt as a measure of overall sustainability
- This is the essence of the stress test analysis

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Numerical Illustration of Shocks

- Assume the following initial position: debt 50% of GDP; primary balance of 1% of GDP (surplus); real interest rate (*r*) of 5%; and real growth rate (*g*) of 3%
- Debt is stable on the basis of above parameters
- If r-g rises by 2 percentage points and primary balance is unchanged, debt rises to about 62% GDP after 10 years
- If r-g rises by 4 percentage points and primary balance is unchanged, debt rises to about 75% GDP after 10 years
- Even temporary shocks can have important implications

In calculations, exact formula is used and the result varies marginally depending on how the change in *r-g* is distributed between *r* and *g*

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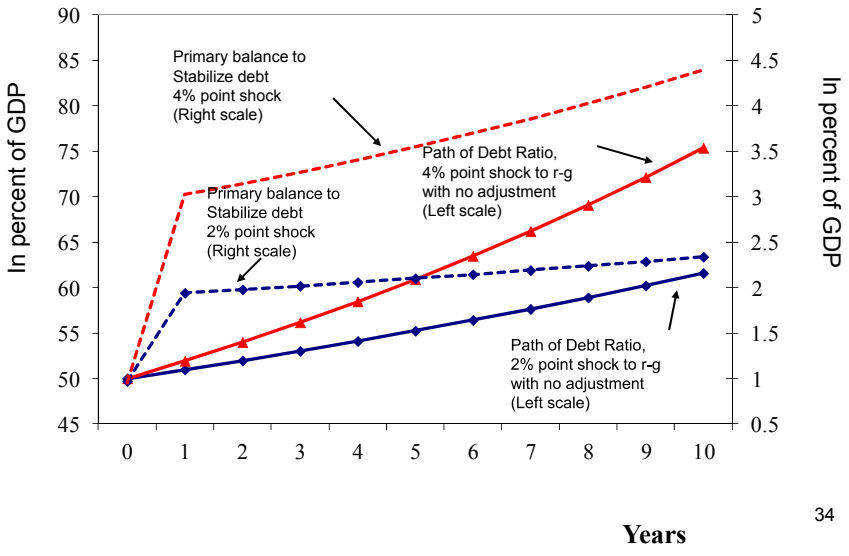
Illustration of Preceding Slide



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Countries with higher debt are more vulnerable to an *r-g* shock and to delays in adjustment

(debt stable in year 0; (*r-g*) rises by 2 percentage points in year 1)

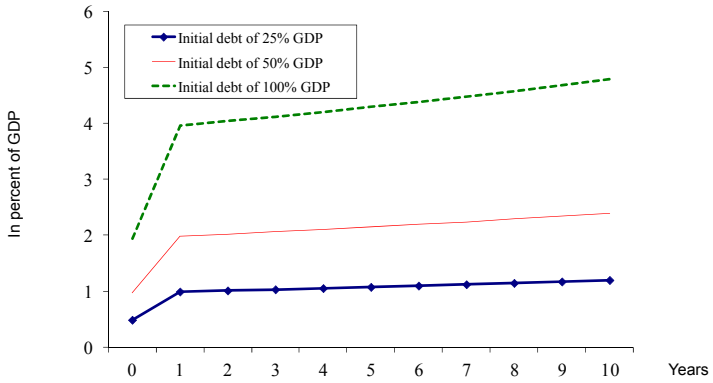

Chart shows how the primary balance needed to stabilize the debt ratio rises following the shock when no adjustment is made. In year 0, debt is stabilized

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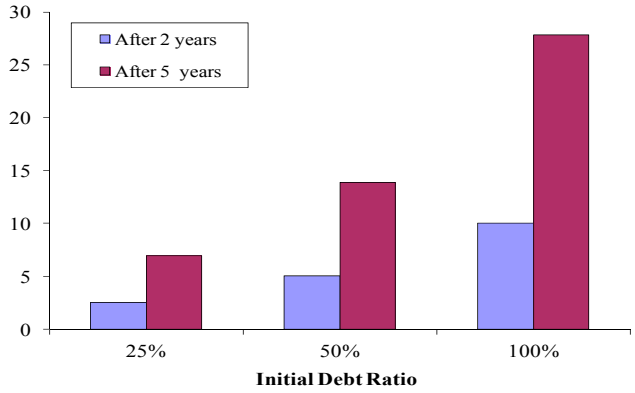
- Even when subsequently reversed, an increase in *r-g* can have a material effect on debt levels, and therefore on the primary balance needed to stabilize debt. The chart shows the increase in the debt ratio, in percent of GDP, for an increase in *r-g* of 5 percentage points.



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Assessing Fiscal Sustainability

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Assessment Issues

- Scope of fiscal accounts
- Realistic projections of r, g, and pb
- Stress tests
- Fiscal sustainability analysis for low-income countries

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Scope of Fiscal Data

- Develop a complete picture of assets and liabilities
  - Off budget operations
  - Quasi fiscal operations
  - Contingent liabilities, explicit and implicit

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Quasi Fiscal Activities (QFAs)

- Fiscal-like operations carried out by the central bank or other (financial or non-financial) public bodies, or the result of regulation imposed on the private sector. QFAs are often a way of circumventing budgetary processes. Examples are:
  - Exchange rate taxes and subsidies (multiple exchange rate practices or misalignment of a unified exchange rate)
  - Credit subsidies and credit allocation regulations
  - Exchange rate, debt, and other guarantees
  - Quantitative import restrictions
  - Regulation of market prices

- *See IMF Occasional Paper on QFAs*

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Contingent Liabilities

- Depend on uncertain events
  - Calls on implicit and explicit guarantees
  - Interaction of balance sheets across sectors

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Projections and Stress Tests

- Start with realistic measure of debt
- Use realistic assumptions on *r*, *g*, and *pb*
- Stress tests to take account of risks, including possible shocks stemming from exchange rate and contingent liabilities
- Take account of weaknesses in revenue and expenditure structure and weaknesses in fiscal institutions
- Note that risks are not independent

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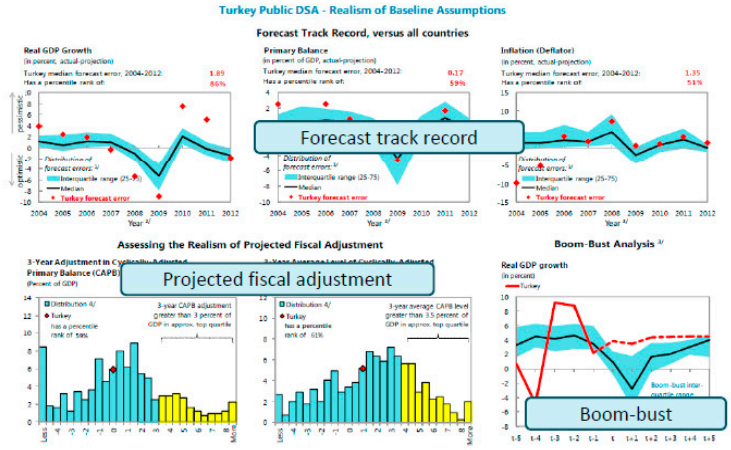
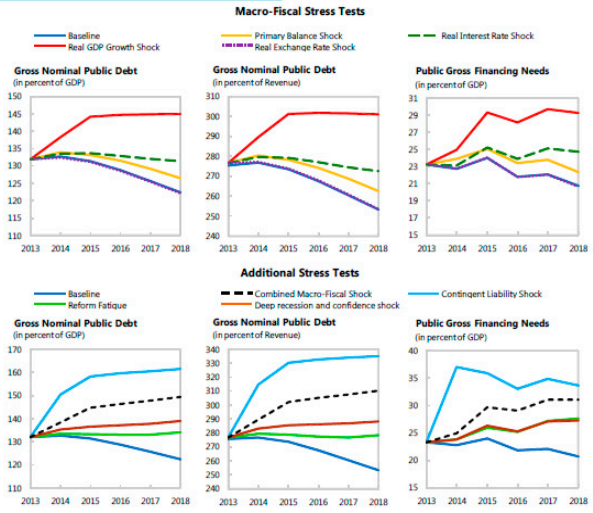
Realism of baseline assumptions



Macro-fiscal stress tests



Heat map

Debt level	Real GDP Growth Shock	Primary Balance Shock	Real Interest Rate Shock	Exchange Rate Shock	Contingent Liability shock
Gross financing needs	Real GDP Growth Shock	Primary Balance Shock	Real Interest Rate Shock	Exchange Rate Shock	Contingent Liability Shock
Debt profile	Market Perception	External Financing Requirements	Change in the Share of Short-Term Debt	Public Debt Held by Non-Residents	Foreign Currency Debt

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Short-Run Vulnerabilities

- Assess sensitivity to key macro variables, including growth, inflation, interest rates, exchange rate etc.
- Pay attention to
  - maturity and currency composition of debt is particularly important
  - specific revenue and spending vulnerabilities
  - lack of clarity about specific budgetary commitments (e.g. bank restructuring)
  - uncertainties about contingent liabilities

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Medium-and Longer-Term Trends

- What do the primary balance, outstanding debt, the size of contingent liabilities and medium term growth prospects say about likely debt profile?
- Longer term weaknesses (e.g., demographic, rapid natural resource depletion, concentration of revenue, nondiscretionary spending, influence of powerful interest groups on spending, budget reporting and control)?
- Do market interest rates and debt ratings suggest a problem?

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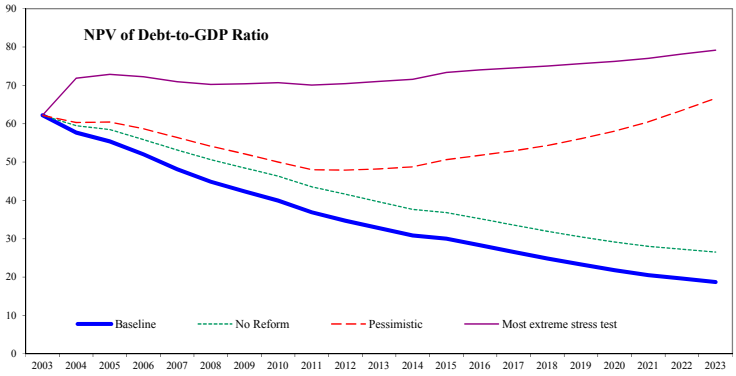
Debt Sustainability Analysis LICs

- Similar analysis, except longer time span and therefore calculate net present value of debt



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Debt Sustainability Analysis LICs

- The only addition, introducing debt-burden thresholds calculated based on the quality of a country's policies
- These thresholds are measured by the World Bank's Country Policy and Institutional Assessment (CPIA) Index, and updated annually
- On the basis of the World Bank's CPIA Index countries are classified in three categories:
  - ✓ Strong performers
  - ✓ Medium performers
  - ✓ Poor performers
- These thresholds are not rigid ceilings and they have to be used as guideposts for informing debt sustainability assessments

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Debt Sustainability Analysis LICs

Policy-Dependent Debt-Burden Thresholds

	NPV of debt in percent of			Debt service in percent of	
	Exports	GDP	Revenue	Exports	Revenue
Poor Performance <3.25	100	30	200	15	25
Medium Performance	150	40	250	20	30
Strong performer >3.75	200	50	300	25	35

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Conclusions

- This lecture has focused on the sustainability of public debt, but the analysis can easily be extended to external debt sustainability. This is especially true in LICs where most of the public debt is external and most of the external debt is public.
- The concept of debt sustainability ultimately captures the ability of a country to grow and generate primary surpluses to service its obligations and does not embody a notion of policy optimality.
- Recent developments in Europe have highlighted the sensitivity of markets towards risk and reinforced the need for governments to adopt credible fiscal frameworks.

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Some Things to Remember

- The debt sustainability analysis shows that a condition for the long-run sustainability of the debt to GDP ratio is r<g.
- The cyclically adjusted fiscal balance is a measure of the overall fiscal balance, adjusted for the business cycle.

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Appendix: Additional Tools

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Reducing debt from ***d*** to a target ***d**** in *k* periods

- First, we define the target as a proportion of the actual debt:

$$d^*_{t+k} = \gamma^* d_t \qquad with \qquad \gamma^* \leq 1$$

- Assuming a constant interest rate, GDP growth rate, and government primary **balance** (*pb**) we can express the solvency condition as:

$$d_t = \left(\frac{1}{\phi}\right)^k \gamma^* d_t + pb^* \sum_{j=1}^{k} \left(\frac{1}{\phi}\right)^j$$

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Reducing debt from ***d*** to a target ***d**** in *k* periods

- Using the following formula from geometric series:

$$\sum_{j=1}^{k} ar^{j} = a\left(\frac{r - r^{k+1}}{1 - r}\right)$$

- The needed primary balance (*pb**) to reduce the debt from *d* to *d** in *k* periods corresponds to:

$$pb^{*} = \left(\frac{(\phi - 1)(\gamma^{*} - \phi^{k})}{1 - \phi^{k}}\right) d_{t}$$

- The lower γ^{*} and/or *k*, the larger *pb** would need to be to reach the debt target in the desired time

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Debt Dynamics – if we assume seigniorage

- Law of motion

$$d_{t} = \phi_{t} d_{t-1} - (pb_{t} + \mu m_{t}) \qquad (2')$$

- Debt dynamics

$$\Delta d_{t} = (\phi_{t} - 1) d_{t-1} - (pb_{t} + \mu m_{t}) \qquad (3')$$

- So, money creation "seems" to plays a similar role to the primary surplus

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What is the role of external financing?

- $\phi_t - 1$ depends on domestic i and π if domestic financing
- It depends also on foreign i and the exchange rate if external borrowing included

$$d_t = \frac{\left[1 + i_t^w + \alpha_{t-1}\varepsilon_t\left(1 + i_t^f\right)\right]}{\left(1 + g_t\right)\left(1 + \pi_t\right)} d_{t-1} - pb_t - um_t$$

i^w	weighted average of domestic and foreign nominal interest rates
i^f	nominal interest rates in foreign-currency denominated debt
ε	change in the exchange rate (local currency per U.S. dollar)
α	share of foreign-currency denominated public debt

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Debt dynamics with external financing

- The government budget constraint:

$$D_t^d + E_t D_t^f = \left(1 + i_t^d\right) D_{t-1}^d + \left(1 + i_t^f\right) E_t D_{t-1}^f - \left(PB_t + \Delta M_t\right)$$

- Which can be re-expressed as:

$$D_t = \left(1 + i_t^d\right)\left(1 - \alpha_{t-1}\right) D_{t-1} + \left(1 + i_t^f\right)\alpha_{t-1}\left(1 + \varepsilon_t\right) D_{t-1} - \left(PB_t + \Delta M_t\right)$$

- Then, dividing both sides by GDP at date t

$$d_t = \frac{\left[1 + i_t^w + \alpha_{t-1}\varepsilon_t\left(1 + i_t^f\right)\right]}{\left(1 + g_t\right)\left(1 + \pi_t\right)} d_{t-1} - pb_t - um_t$$

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L-6. Assessing the External Position

Course on Macroeconomic Diagnostics (OT15.14)
Dar es Salaam, Tanzania
November 30 – December 10, 2015

Dmitriy Rozhkov
Institute for Capacity Development, IMF

Outline

1. Overview of the Main Issues
2. The Current Account Balance in the BOP, National Accounts, and as an Inter-Temporal Choice
3. The Current Account Balance from a Trade Perspective
4. Capital Account Crises—Underlying Causes, Triggers, and Early Warning Systems
5. External Debt Sustainability—Analytical Framework and Stress Testing

Part 1: Overview of Main Issues

- Over the past two decades, financial globalization has accelerated due to:
  - liberalization of capital controls
  - improved technologies and lower costs
- Financial globalization was expected to bring about large benefits
  - better global allocation of capital
  - improved international risk-sharing possibilities
- The surge in financial flows, however, also brought with it a spate of costly currency and financial crises

Overview of Main Issues

- The frequency and costs of crises stimulated interest in methods to diagnose external vulnerabilities and assess whether a country's external position can be regarded as sustainable
- In practice, whether an external position is sustainable requires assessments of
  - The country's net foreign asset (NFA) position
  - Balance of payment flows
  - The real exchange rate, and
  - The expected evolution of these variables over the medium term under a set of policy parameters

Overview of Main Issues

- Issues affecting external sustainability
  - Balance sheet positions of government, firms, banks and households
  - Current account adjustments in response to (real) exchange rate changes and output levels
  - Competitiveness and the equilibrium real exchange rate
  - Potential liquidity problems in external debt service
  - Sensitivity of capital flows to domestic and international developments
  - Adequacy of international reserves

Part 2
The Current Account Balance in the BOP, National Accounts, and as an Inter-Temporal Choice

Defining the Current Account Balance from the BOP

- The current account balance is the difference between exports and imports of goods and services plus net income plus net current transfers
  - Net income includes interest paid on foreign debt, interest received on foreign assets, profit remittances, reinvested earnings, and labor income paid to nonresidents
  - Net current transfers include official and private grants, and worker remittances from/to abroad

The Current Account Balance and Financing of the BOP

- The current account balance is also the mirror image of changes in the capital and financial account of the BOP and changes in international reserves

$$CA = -(\Delta FI + \Delta RES)$$

  - Where ΔFI includes capital transfers, net foreign borrowing, foreign direct investment, net portfolio flows, and errors and omissions
- These are identities, they do not imply causality

The Link with National Accounts

$CA = (EX - IM) + \text{Net Income} + \text{Net current transfers}$

$GDP = C + I + (EX - IM)$

$GNDI = C + I + (EX - IM) + \text{Net Income} + \text{Net current transfers}$

$CA = S\text{-}I = (GNDI - (Cp + Cg)) - (Ip + Ig)$

$CA = S\text{-}I = (S_p - I_p) + (S_g - I_g)$

GNDI … Gross National Disposable Income
CA … Current Account Balance
S – I … Savings/Investment Balance
EX – IM … Exports less Imports of Goods and Services

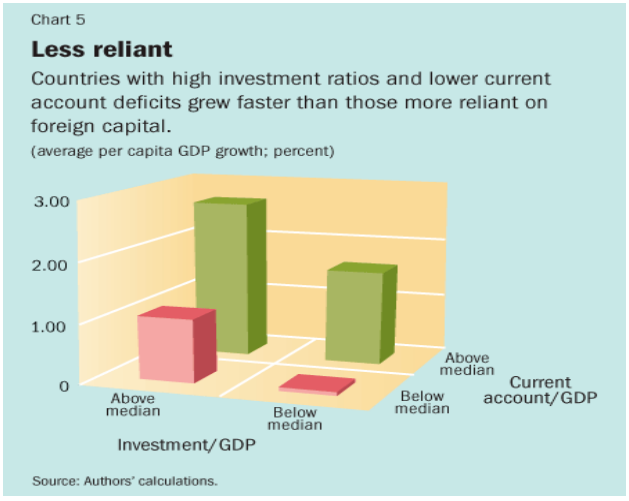
The Current Account Balance as an Inter-Temporal Choice

- The current account balance seen from the perspective of the difference between savings and investment may be viewed as an additional source of financing or accumulation of assets
- An open capital account thus affords an opportunity for a country
  - to increase current C or I by reducing the country's net foreign asset position, and subsequently face repayment;
  - to increase future C or I by increasing the country's net foreign asset position, which means reducing current C and I.

Implications of Inter-Temporal Choice – Long-term Development

- The country's stage of development is sometimes viewed as relevant in assessing the appropriate size of the current account balance.
- A country with a relatively low capital stock may be expected to have higher returns to capital and thus may be able to finance higher investment through capital inflows
- However, a high current account deficit may not be justified if other factors impinge on productivity
- In fact, contribution to growth from foreign capital is debatable. Recent studies show countries with lower current account deficits (and high investment ratios) outperform other countries

Reliance on Foreign Capital and Growth



Source: Finance and Development, *"Reaping the Benefits of Financial Globalization" IMF June 2007*

Impact of Government Savings and Investment

- $CA = (S - I) = (S_p - I_p) + (S_g - I_g)$
- Aside from the direct impact on national S, public S may indirectly affect private I or the private C/S choice through interest rates or expectations.
- To what extent are changes in public S offset by opposite changes in private S? (Ricardian Equivalence)

Impact of Taxes on Current Account Balance

- How do increases in taxes affect the CA balance?
  - Immediate effects: increase in S_g, reductions in (future) public debt and (current) household disposable income.
  - In theory: If C_p is based on permanent disposable income, C remains unchanged as households anticipate lower future tax liabilities. Then, the increase in S_g is fully offset by reduced S_p. CA balance unaffected by fiscal policy.
  - In reality: C_p falls with current disposable income (credit constraints). The increase in S_g is only partially offset by reduced S_p. Hence, overall S and the CA balance may improve when the government increases taxes.
  - In addition, increased taxes may affect I_p (e.g. through reduced profits) and thereby impact GDP in the medium term.

The Difficulty of Interpreting a Current Account Deficit

- A country with a relatively high Current Account Deficit-to-GDP ratio may fit in any of these cases

  1. An imbalance in trade caused by low level of exports/high level of imports—possible loss of competitiveness, and/or expansionary government or credit policies
  2. A country with a high rate of investment relative to domestic savings—but, having a high marginal productivity of capital, or
  3. A country dominated by aid flows

The Difficulty of Interpreting a Current Account Deficit

- So the interpretation of whether a current account deficit is desirable or is too high or too low can only be made taking into account a wider view of the macroeconomic situation and the cause of the deficit

- Countries with high current account deficits are in general more at risk in times of global uncertainty and risk aversion as shown in the following chart

High Current Account Deficits Heighten Vulnerability when Global Risk Aversion Increases

Source: IMF

Part 3
The Current Account Balance from a Trade Perspective

1. Determinants of Imports and Exports
2. The Underlying Current Account

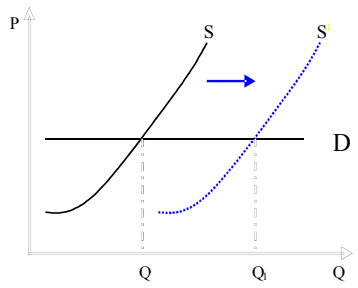
Determinants of Imports and Exports

Determinants of Exports and Imports: "Small" Country vs. "Large" Country

- Small country assumption
  - Prices are determined in the world market
  - Export demand and import supply curves are flat
- Large country assumption
  - A large country may affect prices in the world market
  - Export demand curve may slope downwards
  - Import supply curve may slope upwards

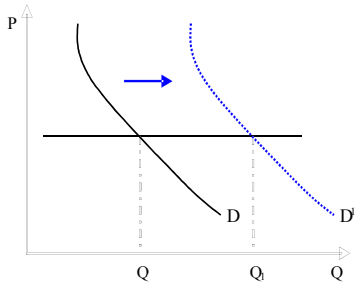
Small Country

Small country export market



- Exports: Country can sell everything it can produce at existing prices
- Even if the supply increases, the price does not change

Small country import market

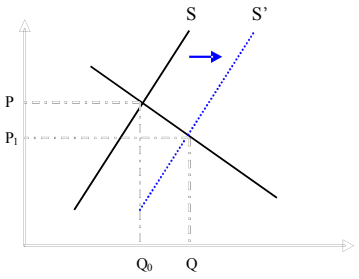


- Imports: Country can buy everything it demands at existing prices
- Even if the demand increases, the price does not change

Large Country

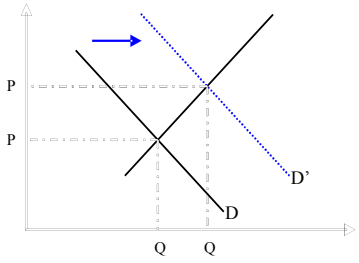
"Large Country" Impact on Int. Markets

Exports



- Exports: A country's attempt to sell more may reduce international prices

Imports



- Imports: A country's own growth and import demand may increase international prices

The demand for exports tends to be...

Flatter

- the smaller the supplier relative to international markets
- the more homogeneous the product
- the easier it is to replace one customer with another
- the easier it is to expand into new countries and regions

More downward-sloping

- the larger the supplier relative to international markets
- the more differentiated the product
- the greater the dependency on specific markets
- the more costly it is to break into new markets

Empirical Analysis of Import Demand

$$M = f(GDP, REER) \quad (+, +)$$

$$M = f(GDP, Pm/PGDP) \quad (+, -)$$

M: Real Imports; GDP: Real GDP;
Pm: Import deflator; PGDP: GDP deflator;
REER: Real effective exchange rate (increase=appreciation)

- Alternatives to GDP: Absorption, GNI for aggregate imports; Consumption, investment, for disaggregated imports
- Alternatives to CPI-based REER: WPI, PPI, or ULC-based REER, etc.
- Additional variables: International import prices, ER volatility, capacity utilization, trade policy variables, etc.

Empirical Analysis of Exports

$$X = f(PARGDP, REER)^{+\ -}$$

$$X = f(PARGDP, Px/PGDP)^{+\ +}$$

X: Real exports; PARGDP: Trading-partner country GDP;
Px: Export price deflator (local currency); PGDP: GDP deflator

- Under "small country" assumption, do partners' activity matter?
- Empirical work usually includes measures of partner activity.
- In the short-run, partners' activity can matter.
- In addition to foreign demand, it is necessary to include a measure of productive potential or capacity utilization

- Additional variables
- International export prices, ER volatility, capacity utilization, trade policy variables, etc.

Estimates of Export and Import Elasticities

- The response of export and import volumes to price and income changes depends critically on elapsed time.

- Empirical work generally shows quite small short-term elasticity coefficients, although these tend to increase through time.

The Underlying Current Account Balance

The Concept of the Underlying Current Account Balance

- The underlying current account balance is the balance that would prevail if:

1. a country and its partners were operating at potential GDP
2. recent exchange rate movements (and other policy or non-policy changes - such as domestic supply shock affecting exports) had fully affected trade volumes, i.e. the RER is constant

Calculating the Underlying Current Account

$$(CUR/Y)_t = a + \Psi_X (X/Y)_t YGAPF_t - \Psi_M (M/Y)_t YGAP_t$$
$$- [\beta_X (X/Y)_t + \beta_M (M/Y)_t] *$$
$$[0.6\ lnR_t + 0.25\ lnR_{t-1} + 0.15\ lnR_{t-2}]$$
$$+ (M/Y)_t\ lnR_t - (X/Y)_t\ lnR_t$$

M,X,Y: nominal domestic currency values of imports, exports and GDP

YGAP: domestic output gap (log of the ratio of real output to potential output)

YGAPF: foreign output gaps (trade weighted average of logs of ratios of real output to potential output for trade competitors)

lnR: log of real exchange rate

Ψ: income elasticity

β: real exchange rate elasticity

See: Peter I sard and Hamid Faruqee eds., 1998, *Exchange Rate Assessment*: Extensions of the Macroeconomic Balance Approach, Occasional Paper 167.

Calculating the Underlying Current Account

- Set:

  $YGAPF_t = YGAP_t = 0$ and
  $lnR_t = lnR_{t-1} = lnR_{t-2}$
  in order to compute the underlying current account:

  $$(UCUR/Y)_t = a - [\beta_X (X/Y)_t + \beta_M (M/Y)_t] * lnR_t + (M/Y)_t\ lnR_t - (X/Y)_t\ lnR_t$$

- Subtract the actual from the underlying current account to obtain:

$$(UCUR/Y)_t = (CUR/Y)_t - \Psi_X (X/Y)_t YGAPF_t + \Psi_M (M/Y)_t YGAP_t$$
$$- [\beta_X (X/Y)_t + \beta_M (M/Y)_t] * [0.4(lnR_t - lnR_{t-1})$$
$$+ 0.15(lnR_{t-1} - lnR_{t-2})]$$

Derivation in Appendix I

Example : United States

United States Underlying Current Account Balance

	1999	2000	2001	2002	2003	2004
U.S. Current Account Balance	-3.2	-4.2	-3.8	-4.5	-4.8	-5.7
Exports to GDP	10.7	11.2	10.2	9.5	9.5	10.0
Imports to GDP	13.5	15.0	13.8	13.6	14.0	15.2
ΔREER (-depreciation)	-0.6	4.9	7.4	-0.4	-8.4	-5.5
U.S. Output Gap	1.9	2.2	-0.5	-2.0	-2.5	-1.6
Output Gap in Selected Partners	0.1	1.5	0.4	-0.1	-0.9	-0.7
U.S. Underlying CA Balance						-5.2
Assumptions						
Export elasticity	0.71	0.71	0.71	0.71	0.71	0.71
Import elasticity	0.92	0.92	0.92	0.92	0.92	0.92
Income elasticity	1.5	1.5	1.5	1.5	1.5	1.5
Foreign income elasticity	1.5	1.5	1.5	1.5	1.5	1.5

Part 4
Capital Account Crises

Major Financial and Currency Crises

- Emerging Market Capital Account Crises
  - The Mexican "Tequila" crisis (1994)
  - Thailand, Indonesia, Korea and other Asian countries (1997)
  - Russia (1998)
  - Brazil (1999)
  - Turkey and Argentina (2001)

What Happens in a Typical Crisis?

- While all emerging market crises tend to differ in their causes and sequencing, there are some similarities:
  - Investor confidence is undermined
  - Exchange rate comes under pressure
  - Capital inflows become outflows
  - International reserves decline
  - Financial sector comes under stress
  - Domestic demand collapses
  - Unemployment and poverty rises
  - Downward spirals that tend to overshoot

Identifying Underlying Causes of Crises

- Weak macroeconomic fundamentals
- Overly appreciated exchange rates
- Financial sector weaknesses
- Leveraging--Unsustainable public or private debt
- Self-fulfilling expectations/financial panic
- Contagion and herding
- Political factors

Note: Lecture 8 will cover causes from the perspective of balance sheet mismatches

Crisis Triggers

- There are various triggers that affect the timing of crises:
  - Political uncertainties, particularly regime change (Mexico)
  - Failure to obtain official financing (Russia, Argentina)
  - External events and contagion (Korea, Indonesia, Brazil)
  - Asset price deflation (Thailand)

Spotting the Next Crisis

- Different causes in each new wave of crises
- There are limits to individual country risk analysis
- Cross-section econometric techniques

International Reserves

- Reserves act as insurance cover to smooth (i.e. finance) temporary stops in capital flows rather than having to reduce domestic absorption. Also, a high level of reserves gives confidence and reduces incentives for speculation.
- Reserves have a financial return that depends on interest earned and currency movements, but also they have an opportunity cost as they could be used to retire public debt and lower future interest payments or be used to finance capital expenditure
- The accumulation of reserves may be accompanied by sterilization, in which case there will be costs associated with the issuance of central bank or government paper

International Reserves--Adequacy

- Traditional measures of adequacy of reserves were in terms of trade flows (months of imports) or money stock or GDP with different levels associated with floating or fixed exchange rates

Reserve Adequacy	
Coverage to:	Traditional Criteria
Imports (M)	3-4 months of M
Money (M2)	5-10% if floating ER 10-20% if fixed ER
Foreign Debt Service (FDS)	1 year of foreign debt amortizations

International Reserves (II)

- In the last 10-15 years greater prominence has been given to avoiding vulnerabilities arising from the capital account
- Do reserves cover projected debt service payments?
  - Importance of measures such as fx reserves/short-term external debt

International Reserves (III)

- The sharp rise in reserves in Asia following the 1997 crisis, and the large current account surpluses recorded by China, are of a different scale than contemplated previously.
- This raised some global stability issues in 2008 as the net cost of accumulating reserves was becoming a source of concern for some countries and that led to changes in reserve management policies
- However, the large reserve accumulation helped Asian countries to weather better the most recent crisis

Part 5
External Debt Sustainability Analytical Framework

External Debt Sustainability: Definitions

- External debt sustainability
  - External debt is "sustainable" if borrowers (private and public) are expected to service such debt without unrealistically large future corrections of their balance of income and expenditure
- External debt sustainability analysis
  - Assess whether the level of external debt will remain constant, grow, or fall over time relative to the sources of external income
  - NB. Non-debt liabilities (dividends and profits) are also potentially important determinants of sustainability over the longer term

External Debt Flows and BOP

Current Account			
Net Exports	XN		
Net Transfers	TR		
Interest on for. debt	ID		
Return on for. assets	IOA		
net of non-debt for. liabs			
Current Account Balance	CA	= XN + TR - ID +IOA	

Capital & Financial Acct			Stock	
Debt Generating Flows	DF		D	
Non-Debt Generating Flows	OAF		OA	
CA = - DF - OAF		DF = - CA - OAF		

The Primary External Current Account

- Step 1: Decompose Current Account into debt and non-debt related elements

- The Primary External Current Account (CAP) consists of all elements of the current account except net interest payments on debt:

CAP = CAB – Net Interest Payments
CAP = XN + TR + IOA

XN … Net Exports
TR … Net Current Transfers
IOA … Return on foreign assets net of non-debt foreign liabilities

External Debt – Analytical Framework

- Step 2: Decompose Capital Flows into those affecting debt and those not affecting debt:

-CAB = DF+OAF*

DF … debt-generating flows
OAF* … non debt-generating inflows

- Step 3: Group the elements that do not affect debt (TB):

TB = CAP + OAF*

- When OAF*>0 → net inflow; when CAP<0 primary current account is in deficit
- When TB<0, debt must increase to cover for TB and interest payments. If TB=0, debt must increase to cover the interest payments

External Sustainability: Analytical Framework, cont'd.

- Step 4: Group the elements that affect debt and equate with non-debt flows:

$$DF - ID = -TB = -(CAP + OAF^*)$$

- The change in external debt ($D^*_t - D^*_{t-1}$) = interest payments – non-interest CAB (CAP) – non debt-generating capital inflows (OAF*)

$$D^*_t - D^*_{t-1} = i^* D^*_{t-1} - TB_t$$

i^* … average interest rate on foreign debt

TB_t … non-interest CAB + non-debt generating inflows

External Sustainability: Basic Equations

$$D^*_t - D^*_{t-1} = i^* D^*_{t-1} - (CAP_t + OAF_t)$$

$$D^*_t = (1+i^*) D^*_{t-1} - TB_t$$

- Iterate the equation forward for N periods gives:

$$D^*_t = \sum_{j=1}^{N} \left(\frac{1}{1+i^*} \right)^j TB_{t+j} + \left(\frac{1}{1+i^*} \right)^N D^*_{t+N}$$

- Debt stock at time t is the discounted sum of expected primary current account balances and changes in non-debt capital flows, plus discounted value of future debt stock at time N

Solvency Condition

$$D*_t = \sum_{j=1}^{N} \left(\frac{1}{1+i*}\right)^j TB_{t+j} + \left(\frac{1}{1+i*}\right)^N D*_{t+N}$$

- A country is solvent if its debt is fully repaid at some point in the future or, equivalently, the current debt stock is fully covered by the present value of future primary current account balances and non-debt capital flows

$$D*_t = PDV_t(TB) \qquad D*_{t+N} = 0$$

- Sustainability: solvency + liquidity + no expectation of unrealistically large adjustment

in the income-expenditure balance.

Debt Stabilizing Criteria

- A less strict criteria than solvency is to have a constant debt-to-GDP ratio. To explore this condition further, use the basic debt sustainability equation below

$$d_t^* = -\left(xn_t + tr_t + ioa_t\right) + \frac{\left(1+r_t^*\right)}{\left(1+g_t\right)} \cdot d_{t-1}^* - oaf_t^*$$

- The debt stock-to-GDP ratio (d) is a function of the primary balance -(xn+tr+ioa), non-debt capital flows expressed as percentage of GDP ($-oaf_t$), the real growth rate (g_t), the real interest rate (r_t), and the previous period debt stock as a percentage of GDP.

The derivation of the basic debt sustainability equation is given in Appendix II.

Debt Stabilizing Criteria (cont'd)

- The change in debt-to-GDP ratio can be written as follows:

Primary CA balance (CAP) in share of output

Non debt cap inflows (OAF) in share of output

$$\Delta d^*_t = -(xn_t + tr_t + ioa_t) + \frac{(r^*_t - g_t)}{(1+g_t)} d^*_{t-1} - oaf^*_t$$

Debt-Stabilizing Primary Current Account

- The primary current account is consistent with a stable external debt ratio when the sustainability equation yields:

$$\Delta d^*_t = 0$$

- Solving for the primary current account balance

$$cap^{DS} = \frac{(r^* - g)}{(1+g)} \cdot d^* - oaf$$

If $cap^{DS} >$ observed cap_t, the external debt is rising

Observed cap_t must increase to make debt stable

Debt-Stabilizing Net Exports

- If we can assume sustainable, long-run average levels of tr, ioa, and oaf

- Debt-stabilizing level of net exports are:

$$xn^{DS} = \frac{(r^* - g)}{(1+g)} \cdot d^* - \left(\overline{tr} + \overline{ioa} + \overline{oaf}\right)$$

- And the Net Exports Gap is:

$$gap_t = xn^{DS} - xn_t \quad \longleftarrow \text{Observed xn}$$

gap_t: adjustment needed to stabilize debt

If $gap_t > 0$ the external debt is rising

Problems with External Debt-Stabilizing Criteria

- The Debt-Stabilizing criteria is a partial equilibrium approach. Variables such as growth or interest rate are assumed independent from the debt dynamics. In real life, however, these variables are determined jointly.

- Having a debt-to-GDP ratio stable is insufficient to guarantee that the external position is sustainable or that a country will not be vulnerable to speculative attacks and capital account reversals.

- Liquidity considerations are also important. A stock of debt may be considered solvent, but if it is too biased towards short term debt, the country may not be able to repay at some moment.

Indicators of External Sustainability

- Short of producing dynamic and long-term projections of debt-to-GDP ratios, analyses often focuses on sustainability indicators
- We want to compare the debt stock to the resources available to service it, mainly:
  - Exports of goods & services: foreign exchange cash flow
  - GDP: total productive capacity that could be mobilized to repay debt

Indicators of External Sustainability

External Debt/GDP (NPV and current)	Debt burden on total productive capacity. Threshold of 80% (severely) and 50% (moderately) indebted
Debt/Exports (NPV & Current)	Debt burden on total income in foreign currency
Debt Service/Exports	Debt service on total income in foreign currency
Reserves	Liquidity concerns, ability to endure shock
Reserves/short term debt	Liquidity concerns, immediate burden
Real Exchange Rate	Reflect export prospects
Inflation	Reflect macro instability, affects RER
GDP Growth	Affects future capacity to pay
Trade Balance	Macro stance, RER, payment prospects
Terms of Trade	Affects future capacity to pay
M2, Credit, Fiscal, Int. rates	Macro stance, signal imbalances, ΔRER

Full Debt Sustainability Analyses

- Assessing debt sustainability on a forward-looking basis requires going beyond the static key indicators approach

- A full debt sustainability analysis requires long-term macroeconomic projections (20 years), including assumptions concerning policies, new borrowing, and the external environment

Take aways

. Difficult to assess if CA deficit is good or not for growth.

. The underlying current account is calculated when output gaps are null and the real exchange rate has fully adjusted.

. An higher amount of reserves reduces the probability of a future crisis (which is still never null) but has a cost for growth.

Group discussion

- Country X has just experienced a rapid increase in GDP growth. Consider scenarios which have different drivers of growth and discuss how each scenario could affect the BoP and external sustainability.
- After experiencing current account surpluses over a 10 year period, Country X now has a current account deficit. Is this a source of concern?
- Country X has just passed some structural reforms to improve the business environment and attract foreign investors, as well as significantly reducing capital controls. Discuss the potential impact on the BoP and sustainability.

Appendix I: Calculating the Underlying Current Account: Derivation

$$UCUR/Y - CUR/Y = a - [\beta_X (X/Y) + \beta_M (M/Y)] \ln R + (M/Y) \ln R - (X/Y) \ln R$$
$$- a - \Psi_X (X/Y) YGAPF + \Psi_M (M/Y) YGAP$$
$$+ [\beta_X (X/Y) + \beta_M (M/Y)]*[0.6 \ln R + 0.25 \ln R_{-1} + 0.15 \ln R_{-2}]$$
$$- (M/Y) \ln R + (X/Y) \ln R$$

$$UCUR/Y = CUR/Y - \Psi_X (X/Y) YGAPF + \Psi_M (M/Y) YGAP$$
$$- [\beta_X (X/Y) + \beta_M (M/Y)]*[\ln R - 0.6 \ln R - 0.25 \ln R_{-1} - 0.15 \ln R_{-2}]$$

$$UCUR/Y = CUR/Y - \Psi_X (X/Y) YGAPF + \Psi_M (M/Y) YGAP$$
$$- [\beta_X (X/Y) + \beta_M (M/Y)]*[0.4 \ln R - 0.4 \ln R_{-1} - 0.25 \ln R_{-1} + 0.4 \ln R_{-1} - 0.15 \ln R_{-2}]$$

$$UCUR/Y = CUR/Y - \Psi_X (X/Y) YGAPF + \Psi_M (M/Y) YGAP$$
$$- [\beta_X (X/Y) + \beta_M (M/Y)]*[0.4 (\ln R - \ln R_{-1}) + 0.15 (\ln R_{-1} - \ln R_{-2})]$$

Appendix II: Derivation of Basic Debt

- First express variables as ratios to GDP expressed in foreign currency: i.e.

$d = D/Y^{\$}$, $ca = CA/Y^{\$}$, $oaf = OAF/Y^{\$}$ etc.

- Then the Current Account-to-GDP ratio is:

$ca_t = xn_t + tr_t + i_{oa,t}oa_t - i_t d_{t-1}$
$= (oa_t - oa_{t-1}) - (d_t - d_{t-1}) = (oaf_t - df_t)$ (Eq.1)

- Rewrite equation 1, multiplying and dividing interest payments and return on foreign assets by $Y\$_{t-1}$

$$\frac{CA_t}{Y_t^{\$*}} = \frac{XN_t}{Y_t^{\$*}} - i_t^* \cdot \frac{D_{t-1}^*}{Y_{t-1}^{\$*}} \cdot \frac{Y_{t-1}^{\$*}}{Y_t^{\$*}} + i_{OA,t}^* \cdot \frac{OA_{t-1}^*}{Y_{t-1}^{\$*}} \cdot \frac{Y_{t-1}^{\$*}}{Y_t^{\$*}} + \frac{TR_t}{Y_t^{\$*}}$$

$$= \left(\frac{OA_t^*}{Y_t^{\$*}} - \frac{OA_{t-1}^*}{Y_{t-1}^{\$*}} \cdot \frac{Y_{t-1}^{\$*}}{Y_t^{\$*}} \right) - \left(\frac{D_t^*}{Y_t^{\$*}} - \frac{D_{t-1}^*}{Y_{t-1}^{\$*}} \cdot \frac{Y_{t-1}^{\$*}}{Y_t^{\$*}} \right)$$

Appendix II: Derivation of Debt Stabilizing Criteria

- Note that: $Y\$t = Yt / Et$ where E is the nominal exchange rate

$Y^{\$}_{t-1} / Y^{\$}_t = 1/(1+nm_t)$

nm_t … rate of nominal GDP growth, and

$E_t / E_{t-1} = (1 + ex_t)$

ex_t … change in the nominal exchange rate

- Current Account balance to GDP ratio can then be written

$ca_t = xn_t + tr_t - i_t d_{t-1}[(1+ex_t)/(1+nm_t)] +$
$i_{oa,t}.oa_{t-1}[(1+ex_t)/(1+nm_t)]$
$= oa_t - oa_{t-1}[(1+ex_t)/(1+nm_t)]$
$-d_t + d_{t-1}[(1+ex_t)/(1+nm_t)]$ (Eq. 2)

Appendix II: Derivation of Debt Stabilizing Criteria

- From eq. 2, solve for d_t

$d_t = - (xn_t + tr_t) + [d_{t-1} ((1 + i)(1+ex))/(1+nm)] - [oa_{t-1.} ((1+ioa_t)(1+ex))/(1+nm)] + oa_t$

- Nominal GDP growth can be decomposed in real GDP growth (g_t) and inflation (p_t), as follows:

$(1+nm_t) = (1+g_t).(1+p_t)$

- And assume that (uncovered) interest parity and the Fisher equation hold:

$$(1+i).(1+ex) = (1+i) = (1+r).(1+p)$$

r … real interest rate

Appendix II: Derivation of Debt Stabilizing Criteria

- The sustainability equation can then be expressed as follows:

$$d_t^* = -(xn_t + tr_t) + \frac{(1+r_t^*)}{(1+g_t)} \cdot d_{t-1}^* - \frac{(1+r_{OA,t}^*)}{(1+g_t)} \cdot oa_{t-1}^* + oa_t^*$$

Appendix II: Derivation of Debt Stabilizing Criteria

- Simplifying for the estimation of ioa, the basic debt sustainability equation is given below. The debt stock-to-GDP ratio at time t is a function of the primary balance and the non-debt capital flows ratios to GDP, the real growth rate, the real interest rate, and the previous period debt stock as a ratio to GDP.

$$d_t^* = -\left(xn_t + tr_t + ioa_t\right) + \frac{\left(1 + r_t^*\right)}{\left(1 + g_t\right)} \cdot d_{t-1}^* - oaf_t^*$$

L-7. Competitiveness and the Exchange Rate

Course on Macroeconomic Diagnostics (OT15.14)
Dar es Salaam, Tanzania
November 30 – December 10, 2015

Dmitriy Rozhkov
Institute for Capacity Development, IMF

I. Overview of Issues

II. Analyzing Trends in Indices of the Real Effective Exchange Rate

Issues to be covered

- Motivation:
  - assess sustainability/avoid external crises
  - promote growth/benefit from market integration.
- The exchange rate is a key relative price
  - In line with fundamentals? If not, potential for
    - misallocation of resources
    - market pressure and instability
- Distinguish between short run and long run
- Two approaches to assessing the exchange rate.
  - Assess equilibrium exchange rate
  - Assess recent developments in the exchange rate and other variables

3

Concepts and Measures

- Bilateral/Multilateral
- Nominal/Real

4

Bilateral nominal exchange rate

The exchange rate is the price of one currency expressed in terms of another currency.

two conventions

- E: Price of home currency in terms of foreign currency
- R: Price of foreign currency in terms of home currency

$$E = 1 / R$$

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Multilateral Exchange Rate
Nominal Effective Exchange Rate (NEER)

The Nominal Effective Exchange Rate (expressed as an index) is the ratio of an index of a currency's period average exchange rate to a weighted geometric average of exchange rates for the currencies of selected countries and the euro area.

(IMF definition)

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NEER calculation

- Using the geometric averaging method:

$$NEER = \prod_i E_i^{w_i}$$

For the choice of the weights, many options are available

- Some examples:
  - Bilateral trade weights
    - import weights
    - export weights
    - overall trade weights

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NEER as a measure of competitiveness

- The NEER is a nominal variable
- Advantages
  - Timeliness
  - Frequency
  - Avoidance of measurement errors in cost/price indices
  - Cross-country-comparability
- NEER is a useful measure of competitiveness developments over short time spans, but loses value over longer time spans as it does not account for changes in cost/price.

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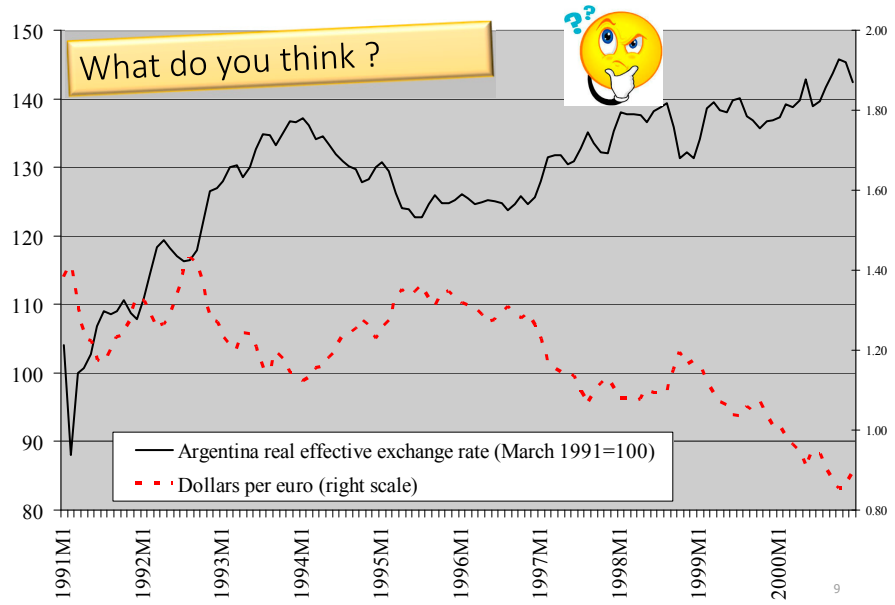
Argentina: Real Effective Exchange Rate and Euro/Dollar Exchange Rate



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The Real Exchange Rate

- Three important theoretical perspectives:
  - Deviations from Purchasing Power Parity
  - Relative price of non-tradable and tradable goods
  - Profitability in producing traded goods

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A Purchasing Power Parity based definition of the Real Exchange Rate

$$RER = E\frac{P}{P^*}$$

RER = the real exchange rate
E = the nominal exchange rate
P= the domestic price level
P= the foreign price level*

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What is Purchasing Power Parity?

- The Law of One Price

$$p_i^* = Ep_i$$

- (Absolute) Purchasing Power Parity

$$P^* = EP$$

$$\Rightarrow RER = \frac{EP}{P^*} = 1$$

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Purchasing Power Parity

- PPP might not hold:
  - Transport costs, other inputs, differentiated goods, non traded goods, etc.
- Relative Purchasing Power Parity

  instead of $RER = EP/P^*$

  use $\% \Delta (RER) = \% \Delta (EP/P^*)$
- Base index only on prices of traded goods?

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Starbucks coffee: the new Big Mac

- Starbucks has denied ripping off coffee drinkers in China, arguing that it makes no more profit per cup than in the United States
- A tall latte costs 27 yuan or $4.40 in Beijing, while the same drink costs about a dollar less in Chicago; Starbucks coffee mug -- which is made in China -- sells for between $10 and $14 in the U.S., and as much as $18 in China.
- Starbucks claims that higher prices were a reflection of the higher local costs for employee training and sourcing.
- Starbucks also claims that, compared to some Western markets, where consumers often take their orders to go, Chinese customers are likely to linger, necessitating much larger than normal stores.

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RER: Relative price of non tradables and tradables

$$RER_t = \frac{E_t P_t}{P_t^*}$$

- Write in logs:
- Suppose the price index is a geometric average of traded and non-traded prices:

$$rer_t = e_t - p_t^* + p_t$$

$$p_t = \alpha\, p_t^N + (1-\alpha)\, p_t^T$$

$$p_t^* = \alpha^* p_t^{N*} + (1-\alpha^*) p_t^{T*}$$

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Relative price of non tradables and tradables

$$rer_t = e_t - p_t^{T*} + p_t^T - \alpha^*(p_t^{N*} - p_t^{T*}) + \alpha(p_t^N - p_t^T)$$

Three components:

. The relative price of tradable goods across countries

. The relative price of non-tradable goods in terms of tradable goods abroad

. The relative price of non-tradable goods in terms of tradable goods at home.

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RER as a Measure of Competitiveness

- What do we mean by competitiveness?
- Typically, we consider it in the context of the external balance on goods and services.
- But a range of other perspectives—from attractiveness as investment location to longer-term income growth.

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But, the inference may not be correct

For example.....

- Balassa-Samuelson effects: a tendency for countries with higher productivity growth in tradable compared with non-tradable goods to have higher inflation. Long-run effect for an emerging country (supply and demand side).

- Changes in administered prices

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CPI-based REER as Measure of Competitiveness

- A rise relative to a reference year suggests that there is a greater incentive to shift resources from the tradable (exporting) sector to the non-tradable sector in the home country compared with trading partners.

….. thus weakening the external balance on goods and services.

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A change in incentives to produce non-tradable goods does not imply a change in competitiveness

For example…..

- Consider a rapid growth in productivity in the tradable goods sectors. This will tend to strengthen the current account and boost incomes. Higher incomes imply higher demand for non-tradable goods, which requires shift in resources.

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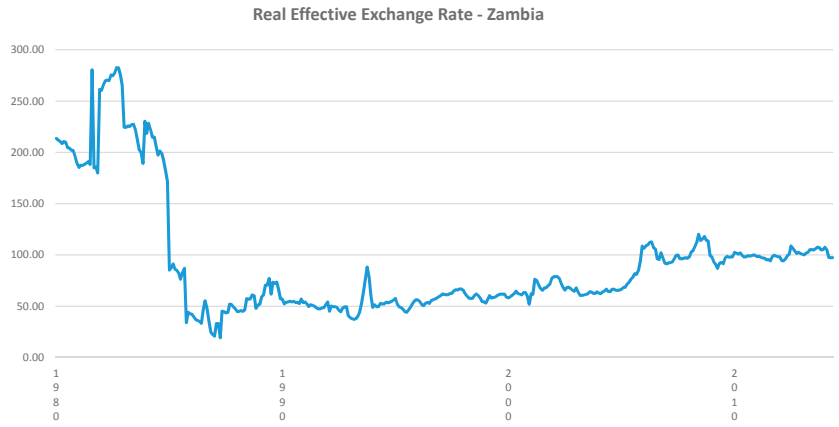
What do you think ?



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CPI-based REER

- Advantages:
  - fairly comparable methodology across countries
  - reasonably accurate
  - rapidly available
  - published frequently
  - No more bilateral.
- Disadvantages:
  - includes tradable goods with different weights
  - excludes capital goods
  - affected by taxes, subsidies & price controls

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REER Based on Unit Labor Costs

- A decrease in unit labor costs *suggests* higher profitability. (abstracting from capital costs)
- Uses manufacturing goods as a proxy for tradable goods
- Interpretation: Depreciation of REER_ULC suggest that it is becoming more profitable to produce tradable goods in the home country relative to trading partners.

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Problems with Use Of REER_ULC

- ❑ Traded goods not homogenous across countries
- ❑ Influence of non-labor costs such as rent and intermediate goods
- ❑ Cyclical effects on ULCs
- ❑ Intrasectoral shifts of production can distort indices
- ❑ Doesn't capture relative profitability of traded and non-traded goods in home country.

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Export market shares as a measure of competitiveness?

- Consider underlying growth rates of global sectoral exports
- Consider changes in structural policy

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Complications in Assessing Exchange Rate Indices

- Conflicting signals from alternate indices, inter alia due to some of the complications noted in preceding slides.
- Trends, not absolute measure of competitiveness. What is benchmark? Benchmark may be shifting as factors underlying equilibrium exchange rate shift.
- Developments in indices may reflect endogenous response to previous changes in producer incentives rather than new developments in incentives.

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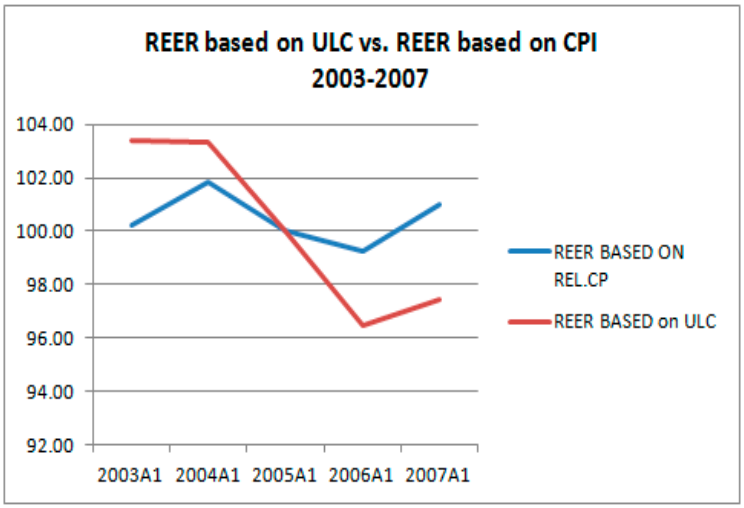
Germany: Indicators of Competitiveness



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Conclusion

- Assessing developments in the exchange rate is an extremely complicated process, requiring considerable judgment.
- Requires a thorough understanding of economic developments and structure in the country in question, as well as of the country's external environment

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Group Questions

How would you define competitiveness?

Which price should be used when building REER?

Discuss the evolution of the REER for a fast growing country?

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III. Estimating the Equilibrium Real Exchange Rate

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What Do We Mean by Equilibrium?

- Real exchange rate is in equilibrium if there is no tendency for it to change. (S-R versus M-R)
- Since the forces molding demand and supply (including economic policies) will change over time, so will the real exchange rate.
- An assessment of the equilibrium real exchange rate typically aims to abstract from temporary shocks.
- Typical approach is to focus on the state of the economy once it has adjusted to cyclical shock and changes in relative prices.
- Not a short-term equilibrium. Rather, a level which is consistent with external and internal balance over the longer-run under medium-term assumptions

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How Are Calculations of Equilibrium Exchange Rate Useful

- In establishing a level at which to peg.
- In making medium-term forecasts
- In assessing sustainability of existing exchange rate peg.
- Deviation of current rate from equilibrium does not imply need for policy action
- Important to note that existing methodologies for estimating equilibrium exchange rate are subject to significant margin of error.

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Variety of Approaches

- PPP
- Macroeconomic Balance Approach (from CGER to EBA)

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1- Purchasing Power Parity

- PPP: Real exchange rate is constant
- Used to obtain an equilibrium level of nominal exchange rate
  - Choose price index
  - Choose the equilibrium level of real exchange rate
- Limitation
  - Sensitivity to price measure and base period. Recall earlier discussion of difficulty in interpreting changes in REER measures over time.

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PPP Adjusted for the Balassa-Samuelson and Penn Effects

- Penn Effect (Observed fact)
  - Ratio of tradable goods prices to non-tradable prices tends to be lower in high-income countries than in low-income countries
- Balassa-Samuelson hypothesis
  - Productivity in tradable sector rises faster than productivity in nontradable as countries develop

→Equilibrium real exchange rate might change with the level of GDP per capita.

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Penn Effect

- International Comparisons Program (ICP)
  - Initiated in the mid-1900s
  - Led by economists from University of Pennsylvania
- PPP under ICP
  - PPP is measured as expenditures valued at domestic prices to expenditures valued at international prices
  - PPP divided by nominal exchange rate (NCU/FCU) is real exchange rate
- Penn effect
  - Real exchange rates is systematically related to the ratio of GDP per capita to U.S. GDP per capita.

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Application: Measuring overvaluation in China (Frankel, 2005)

Regression 1990

$$\log \text{RER} = -3.40 + 0.317 \text{ loginc}$$

Regression 2000

$$\log \text{RER} = -4.15 + 0.382 \text{ loginc}$$

RER – Real Exchange Rate is obtained by dividing *Price Level of Gross Domestic Product* for each country by that of the US (normalised to 100).
LogRER – Log of Real Exchange Rate
rgdpch – Real GDP per capita (Constant price: Chain series)
Loginc – Log of real GDP per capita

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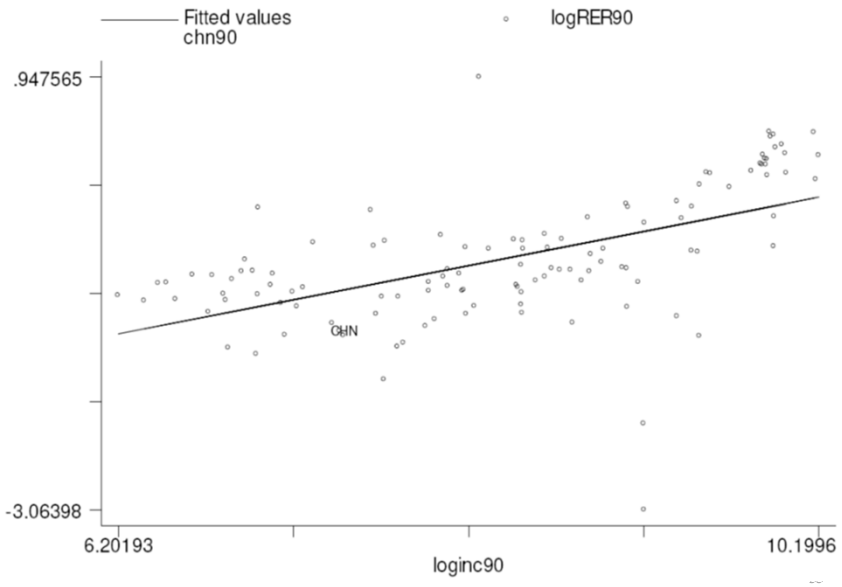
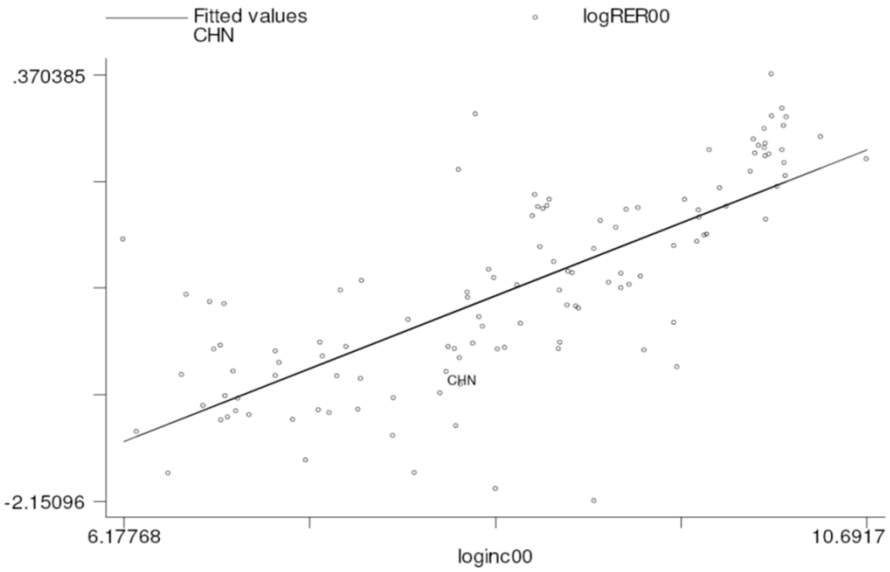
Cross-Country Regression for 1990



Cross-Country Regression for 2000



Interpretation of Regression Line

- Regression line
  - Equilibrium real exchange rates associated with different levels of productivity (GDP per worker).
- Implications
  - Equilibrium real exchange rate appreciates as productivity converges to the level of the highest-productivity country.
- Misalignment
  - Deviations from the regression line

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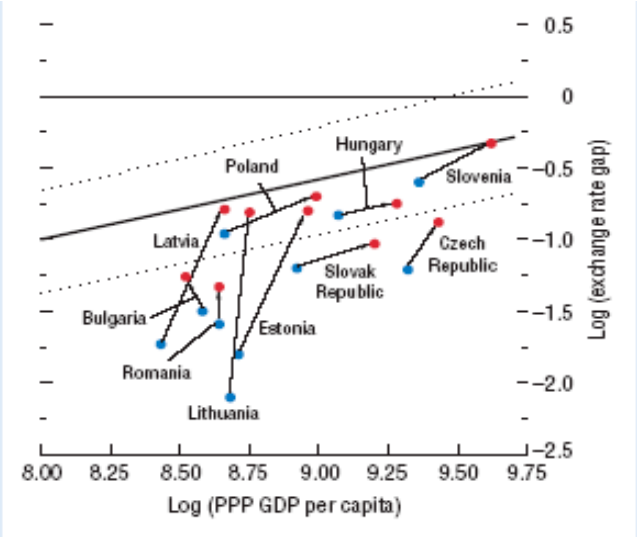
Exchange Rate Gap and Income Level for EU Accession Countries, 1993 - 1999



Blue dot 1993 and red dot 1999 (Source :WEO)

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2- Macroeconomic Balance Approach (from CGER to EBA)

- Find exchange rate that equates underlying current account with assessment of equilibrium current account
  - Internal and external balance
  - equilibrium current account, based on behavior of saving and investment

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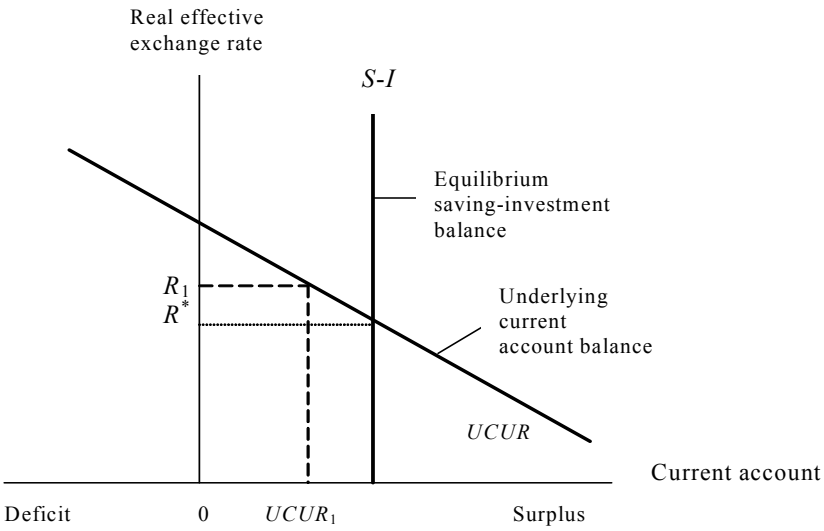
Basic Idea

Chart 3. Medium-Run Fundamentals



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Definition of Underlying Current Account Balance (UCUR)

- Relevant concept for thinking about medium-run projection once temporary and cyclical factors have run their course.
- Current account position that would prevail if output was at potential at home and abroad and the effects of past exchange rate changes had been fully realized.
- Should also adjust for other factors temporarily influencing current account (e.g. one-off large FDI)

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Basic Steps in the Macroeconomic Balance Approach

- Step 1: Calculate UCUR at prevailing R. Call these $UCUR_1$ and R_1.
- Step 2: Calculate the current account "norm" (or equilibrium level of S-I)
- Step 3: Calculate the difference between $UCUR_1$ and the current account norm.
- Step 4: Calculate change in R needed to make UCUR equal to equilibrium level of S-I.
  - The adjusted level of R is the equilibrium REER (R*).
- Step 5: Analyze sensitivity of R* to assumptions about equilibrium S-I and other considerations.

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Example (Aydin 2010)

This constitutes a specific extension of the CGER approach for SSA

Step 1: The UCUR is the 2014 current account projection, reported in the October 2009 WEO.

It assumes a constant real exchange rate and that economy reaches its internal equilibrium (output gap =0).

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Step 2: The current account norm is estimated for a panel of countries form 1973-2008;

$$CAB_{i,t} = \alpha_i + \beta X_{i,t} + \delta Z_{i,t} + \varepsilon_{i,t}$$

- X are macro-fundamental variables: relative income, relative fiscal balance,etc
- Z are controle variables: change in oil production, armed conflicts.

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	CGER[1]			Whole Sample	
	Pooled	Hybrid Pooled	Fixed Effects	Unrestricted	Restricted
Relative old-age dependency	-0.14 ***	-0.12 ***	-0.23 ***	-0.11 *-0.91*	-0.16 * *-1.42*
Relative population growth	-1.21 ****	-1.03 ***	-0.47	0.31 *0.90*	
Relative income (PPPp.c.)	0.02 **	0.02 **		0.01 *1.25*	0.01 *1.09*
Relative income growth	-0.21 ***	-0.16 **	-0.27	-0.47 ** *-1.80*	-0.46 *** *-2.36*
Oil Trade Balance-to-GDP	0.23 ****	0.17 ****	0.31 ****	0.39 **** *5.04*	0.36 **** *5.90*
Relative Fiscal Balance-to-GDP	0.20 ****	0.19 ****	0.32 ****	0.13 *1.03*	0.18 * *1.41*
NFA-to-GDP (-1)	0.02 ****			0.04 **** *4.16*	0.04 **** *3.91*
Aid-to-GDP				0.13 *0.92*	0.10 *0.77*
Remittances-to-GDP				0.14 *1.04*	
Conflict				0.00 *-0.02*	
Change in Oil Production				-0.10 *-0.63*	
Number of Observations				1021	1124
Std Error of Regression				0.07	0.07
Sum of Squared Residuals				4.36	4.74

SSA Specific variables

Notes:

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Step 3: Difference between UCUR and the CA norm.

How UCUR is practically built?

- UCUR is built as the projection of the today's CA over the medium-run
- What is the best method to project of the CA?
- Discussion during the workshop.

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Table 3. Macroeconomic Balance Assessment of Sub-Saharan Africa

	CAB/GDP						
	NORM			Underlying	GAP		
	Lower	Mean	Upper		Lower	Mean	Upper
Angola	3.6	10.7	17.8	4.1	-13.8	-6.7	0.4
Botswana	-3.6	9.0	21.7	3.3	-18.4	-5.7	6.9
Burundi	-41.2	-6.3	28.6	-9.7	-38.2	-3.3	31.6
Côte d'Ivoire	-21.7	-12.1	-2.4	-4.0	-1.6	8.0	17.7
Djibouti	-15.3	1.9	19.0	-19.9	-39.0	-21.8	-4.7
Guinea	-42.4	-12.5	17.4	-3.8	-21.2	8.7	38.5
Guinea-Bissau	-12.8	2.3	17.5	-6.4	-23.9	-8.8	6.4
Lesotho	-17.7	-6.9	3.9	-20.5	-24.4	-13.6	-2.8
Mali	-15.6	-3.1	9.5	-7.9	-17.4	-4.8	7.8
Mauritius	-9.8	3.7	17.2	-7.0	-24.2	-10.7	2.8
Mozambique	-10.1	-5.9	-1.8	-11.2	-9.4	-5.3	-1.1
Namibia	-7.4	0.0	7.3	-0.8	-8.1	-0.8	6.6
Niger	-27.4	-6.9	13.6	-6.6	-20.2	0.3	20.7
Nigeria	-21.7	5.3	32.3	14.5	-17.8	9.2	36.1
Rwanda	-13.8	-6.4	1.0	-7.0	-8.0	-0.6	6.7
Senegal	-9.2	-3.6	2.1	-10.4	-12.4	-6.8	-1.2
Sierra Leone	-19.6	-5.0	9.5	-5.5	-15.1	-0.5	14.1
South Africa	-6.6	1.5	9.6	-7.5	-17.1	-9.0	-0.9
Swaziland	-7.7	0.7	9.2	-3.6	-12.8	-4.3	4.1
Tanzania	-12.7	-6.4	0.0	-9.1	-9.1	-2.8	3.5
Uganda	-7.0	-0.5	6.0	-4.5	-10.4	-3.9	2.6

Note: Lower and upper bands are based on 90-percent confidence interval of the in-sample model fit.

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Step 4: Exchange rate under/over evaluation (eq. 3 p. 13 in Aydin)

$$\Delta \ln R = \{1/[(1- \beta_M) .\lambda_M.(M/Y) - \beta_X .\lambda_X.(X/Y)]\}. \{UCUR/Y - UNORM/Y\}$$

Δ trade balance, % GDP, (imports) per 1% Δ R = $(1- \beta_M) .\lambda_M.(M/Y)$

Δ trade balance, % GDP, (exports) per 1% Δ R = $(-\beta_X-1) .\lambda_X.(X/Y)$

Above in domestic currency terms. Exports takes supply perspective.

Change in relative prices measured relative to GDP deflator. Assumes real GDP is unchanged.

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External Sustainability approach

Table 7. External Sustainability Assessment of Sub-Saharan Africa

	NFA/GDP	Nominal Growth	CAB/GDP NORM	CAB/GDP Underlying	CAB/GDP GAP
Angola	15.2	18.0	2.3	4.1	1.8
Benin	-7.3	8.5	-0.6	-6.6	-6.1
Botswana	73.3	6.0	4.1	3.3	-0.8
Burkina Faso	-64.7	7.8	-4.7	-9.0	-4.3
Burundi	-97.8	9.9	-8.8	-9.7	-0.9
Côte d'Ivoire	-53.6	8.7	-4.3	-4.0	0.3
Djibouti	24.4	9.9	2.2	-19.9	-22.1
Guinea	-16.6	10.3	-1.5	-3.8	-2.3
Guinea-Bissau	-329.1	5.9	-18.3	-6.4	11.8
Lesotho	31.3	8.6	2.5	-20.5	-23.0
Mali	-26.6	7.8	-1.9	-7.9	-5.9
Mauritius	9.9	8.8	0.8	-7.0	-7.8
Mozambique	-70.9	11.2	-7.1	-11.2	-4.1
Namibia	44.0	7.2	3.0	-0.8	-3.8
Niger	-23.3	7.7	-1.7	-6.6	-5.0
Nigeria	31.5	14.3	3.9	14.5	10.5
Rwanda	-3.1	10.9	-0.3	-7.0	-6.7
Senegal	-35.8	6.9	-2.3	-10.4	-8.1
Sierra Leone	-34.9	9.7	-3.1	-5.5	-2.5
South Africa	-36.2	10.0	-3.3	-7.5	-4.2
Swaziland	51.2	7.5	3.6	-3.6	-7.2
Tanzania	-44.8	12.1	-4.8	-9.1	-4.3
Togo	-95.7	6.6	-5.9	0.2	6.1
Uganda	-29.2	11.3	-3.0	-4.5	-1.5

$$CAB_i^n = \frac{g_t}{1+g_t} NFA_i^n$$

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External Balance Assessment (EBA)

- EBA is successor to "CGER" methodology
  - Has a broader set of determinants
  - Focuses on present position rather than on the medium term
  - Takes into account the economic cycle
  - Has a normative part (actual and "recommended" policies)

See http://www.imf.org/external/np/res/eba/ (source for the tables and equations in the rest of the presentation)

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EBA

. Same idea as CGER: Calculate change in R needed to make UCUR equal to CA norm.

. The first stage is positive (descriptive), and focused on understanding current account and real exchange rate developments, via the estimation of panel regressions.

. The second stage goes further, drawing on information from the regression results to estimate the contributions of "policy gaps" to current accounts and real exchange rates

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Panel of 49 countries:

.For Africa, only South Africa and Morroco are included in the CA regression

(Morroco is not included later in the REER regression because of data availability).

. Sample 1986-2010

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Table 1. EBA CA regression

VARIABLES	Benchmark
L. NFA/Y	0.016**
	(0.019)
L. NFA/Y*(dummy if NFA/Y < -60%)	-0.012
	(0.378)
Financial Center Dummy	0.033***
	(0.000)
L.Output per worker, relative to top 3 economies	0.007
	(0.730)
L.Relative output per worker*K openness	0.065***
	(0.003)
Oil and Natural Gas Trade Balance * resource temporariness #	0.615***
	(0.000)
Dependency Ratio #	-0.030
	(0.476)
Population Growth #	-0.629
	(0.107)
Aging Speed (proj. change in old age dependency ratio) #	0.156***
	(0.000)
GDP growth, forecast in 5 years #	-0.471***
	(0.000)
L.Public Health Spending/GDP #	-0.551***
	(0.000)
L.demeaned VIX*K openness	0.068***
	(0.000)
L.demeaned VIX*K openness*share in world reserves	-0.136*
	(0.056)
Own currency's share in world reserves	-0.045***
	(0.000)
Output Gap #	-0.400***
	(0.000)
Commodity ToTgap*Trade Openness	0.230***
	(0.000)
Safer Institutional/Political Environment (index) #	-0.109***
	(0.000)
Demeaned Private Credit/GDP #	-0.026***
	(0.002)
Cyclically adjusted Fiscal Balance, instrumented #	0.324***
	(0.001)
(ΔReserves)/GDP* K controls, instrumented #	0.346**
	(0.040)
Constant	-0.014***
	(0.000)
Observations	1080
Number of countries	49
Root MSE	0.033

P-values of Het-corrected z-statistics in brackets
* significant at 10%; ** significant at 5%; *** significant at 1%
"L." denotes one year lag.
Note: variables denoted with # are constructed relative to a (GDP-weighted) country sample average, in each year.

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Second Step: Identifying Policy Gaps

- Fiscal policy: difference between cyclically-adjusted fiscal balance now and the level recommended for the future
- Social protection (government health expenditure/GDP): benchmark from a regression taking account of level of development and demographics
- Capital controls (Quinn index): benchmark is cross-country average degree of controls (or the current value, if lower)
- Change in reserves: if the *level* of reserves is well above adequacy range, benchmark is zero change. Otherwise, benchmark is the actual change.
- Credit to GDP: Financial excesses—and the failure of policies to prevent them—may cause demand booms, weakening current accounts, and real appreciation.

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Table 10. EBA CA regression: structural indicators

VARIABLES	Benchmark						Dropping Norway and Russia
L. NFA/Y	0.016**	0.016**	0.017***	0.019***	0.017**	-0.004	0.017**
	(0.019)	(0.015)	(0.009)	(0.005)	(0.017)	(0.763)	(0.013)
L. NFA/Y*(dummy if NFA/Y < -60%)	-0.012	-0.012	-0.014	-0.015	-0.024	-0.014	-0.013
	(0.378)	(0.347)	(0.286)	(0.261)	(0.100)	(0.485)	(0.327)
Financial Center Dummy	0.033***	0.033***	0.031***	0.034***	0.024***	0.031***	0.030***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.002)	(0.003)	(0.000)
L.Output per worker, relative to top 3 economies	0.007	0.003	0.002	0.005	0.024	0.086	0.018
	(0.730)	(0.896)	(0.907)	(0.826)	(0.248)	(0.349)	(0.416)
L.Relative output per worker*K openness	0.065***	0.069***	0.068***	0.072***	0.047**	0.094	0.064***
	(0.003)	(0.002)	(0.002)	(0.003)	(0.030)	(0.345)	(0.004)
Oil and Natural Gas Trade Balance * resource temporariness #	0.615***	0.595***	0.595***	0.605***	0.678***	0.183	0.729**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.291)	(0.013)
Dependency Ratio #	-0.030	-0.031	-0.032	-0.018	-0.077*	0.326***	-0.037
	(0.476)	(0.470)	(0.473)	(0.687)	(0.098)	(0.001)	(0.388)
Population Growth #	-0.629	-0.427	-0.428	-0.429	-0.821*	-1.064	-0.502
	(0.107)	(0.280)	(0.270)	(0.303)	(0.057)	(0.109)	(0.172)
Aging Speed (proj. change in old age dependency ratio) #	0.156***	0.182***	0.191***	0.199***	0.146***	0.207***	0.135***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
GDP growth, forecast in 5 years #	-0.471***	-0.494***	-0.497***	-0.494***	-0.475***	-0.321	-0.438***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.396)	(0.000)
L.Public Health Spending/GDP #	-0.551***	-0.558***	-0.557***	-0.640***	-0.842***	0.102	-0.567***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.734)	(0.000)
L.demeaned VIX*K openness	0.068***	0.069***	0.069***	0.074***	0.034	0.050	0.067***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.117)	(0.297)	(0.000)
L.demeaned VIX*K openness*share in world reserves	-0.136*	-0.145**	-0.147**	-0.160**	-0.023	-0.137	-0.120*
	(0.056)	(0.036)	(0.031)	(0.026)	(0.799)	(0.436)	(0.093)
Own currency's share in world reserves	-0.045***	-0.044***	-0.045***	-0.046***	-0.029**	-0.069***	-0.052***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.021)	(0.001)	(0.000)
Output Gap #	-0.400***	-0.402***	-0.401***	-0.378***	-0.416***	-0.030	-0.414***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.851)	(0.000)
Commodity ToTgap*Trade Openness	0.230***	0.232***	0.232***	0.237***	0.338***	0.392***	0.163***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.003)
Safer Institutional/Political Environment (index) #	-0.109***	-0.111***	-0.109***	-0.117***	-0.089***	-0.084	-0.101***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.105)	(0.000)
Demeaned Private Credit/GDP #	-0.026***	-0.024***	-0.024***	-0.024***	-0.021*	-0.032**	-0.026**
	(0.002)	(0.005)	(0.003)	(0.006)	(0.056)	(0.017)	(0.016)
Cyclically adjusted Fiscal Balance, instrumented #	0.324***	0.311***	0.301***	0.363***	0.126	0.727***	0.353***
	(0.001)	(0.001)	(0.002)	(0.000)	(0.217)	(0.002)	(0.000)
(ΔReserves)/GDP* K controls, instrumented #	0.346**	0.330*	0.349*	0.425**	0.355	0.803	0.337**
	(0.040)	(0.059)	(0.051)	(0.035)	(0.154)	(0.509)	(0.043)
Less labor regulations		-0.296**	-0.384**	-0.236*			
		(0.022)	(0.029)	(0.076)			
Less labor regulations * EMU dummy			0.603**				
			(0.040)				
EMU dummy			0.011*				
			(0.061)				
unemployment rate				0.001*			
				(0.084)			
Unemployment insurance					0.027**		
					(0.050)		
Employment protection legislation					0.004***		
					(0.004)		
Unemp. Insurance * empl. Protection					0.003		
					(0.662)		
Product Market Regulation						0.010	
						(0.343)	
Constant	-0.014***	-0.015***	-0.015***	-0.016***	-0.021***	-0.072***	-0.014***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Observations	1080	1053	1053	975	813	220	1040
Number of countries	49	49	49	49	49	20	47
Root MSE	0.033	0.032	0.032	0.033	0.031	0.025	0.032

P-values of Het-corrected z-statistics in brackets
* significant at 10%; ** significant at 5%; *** significant at 1%
"L." denotes one year lag.
Note: variables denoted with # are constructed relative to a (GDP-weighted) country sample average, in each year.

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Third Step: UCUR adjusted for cycles

- Reminder CGER: Projection of the UCUR over the medium-run.
- EBA: Today's Current account is cyclically adjusted. Less arbitrary approach.

Fourth Step:

. Calculate change in R needed to make UCUR equal to equilibrium level of S-I.

- Similar to CGER

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Take aways

. Exchange rate definition is important as an increase (decrease) could be either an appreciation either a depreciation.

. RER appreciation is usually interpreted as a loss in competitiveness

But for emerging countries it could not constitute an issue.

. Several methods have been proposed to estimate the equilibrium value of the RER (PPA, CGER, EBA).

Group Questions

How would you define the equilibrium REER?

What is the specificities of the Penn effect?

What are the differences between the CGER and EBA?

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Course on Macroeconomic Diagnostics

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L8-. Assessing the Financial system and Balance Sheet

Course on Macroeconomic Diagnostics (OT15.14)

Dar es Salaam, Tanzania
November 30 – December 10, 2015

Dmitriy Rozhkov
Institute for Capacity Development, IMF

2 Case Studies

I. The Asian Crisis 1997

II. The Balance Sheet Approach and the European crisis 2008.

I. Study Case: Asia 1997

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Asia 1997

- After decades of outstanding economic performance in Asia
- Primarily the result of problems in the financial system.
- Threatened many Asian countries' financial systems and disrupted their real economies, with large contractions in activity

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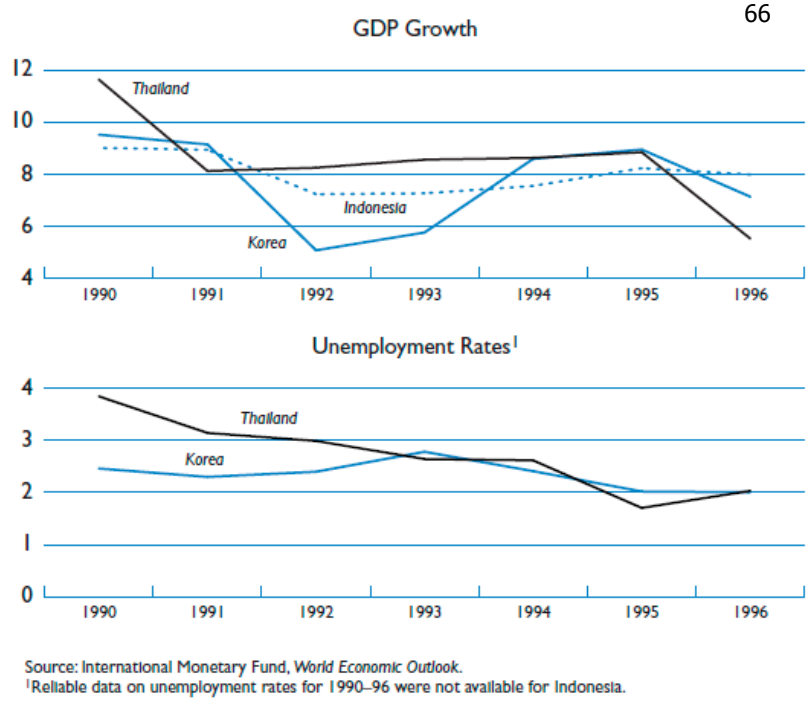

Source: International Monetary Fund, *World Economic Outlook*.
[1]Reliable data on unemployment rates for 1990–96 were not available for Indonesia.

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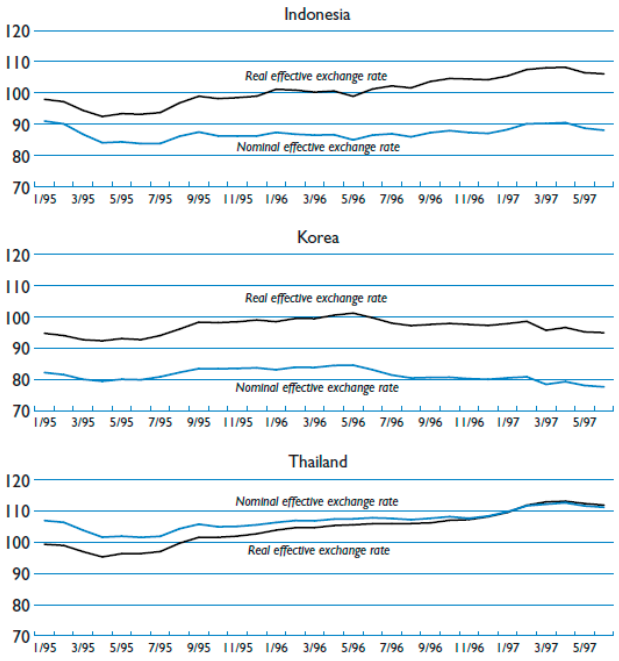

Source: International Monetary Fund, *International Financial Statistics*.
[1]An increase denotes an appreciation.

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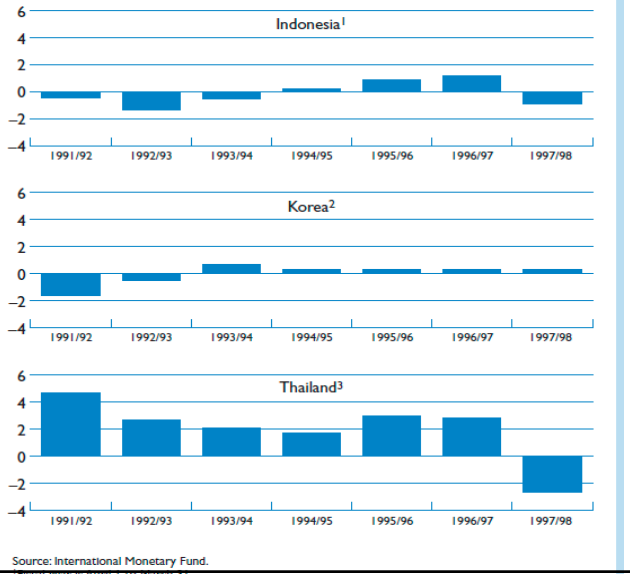
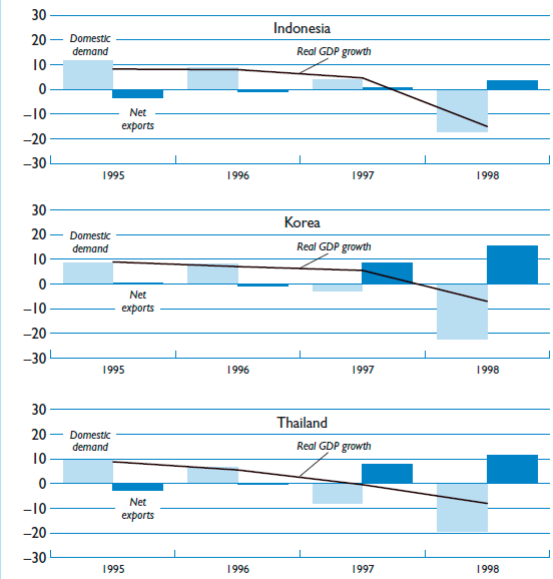
Central Government Balances



Source: International Monetary Fund.

69

Figure 5.1. Indonesia, Korea, and Thailand: Domestic and External Demand
(Annual contribution to GDP growth, in percent)



Source: International Monetary Fund, *World Economic Outlook*.

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Effect on the real economy

Country	GNP		Change
	June 1997	July 1998	
Thailand	170	102	– 40.0%
Indonesia	205	34	– 83.4%
Philippines	75	47	– 37.3%
Malaysia	90	55	– 38.9%
South Korea	430	283	– 34.2%

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- Developments in advanced economies, such as weak growth in Europe and Japan that left a shortage of attractive investment opportunities and kept **interest rates low** in those economies, also contributed to the buildup of the crisis.
- Banks and corporations borrowed large amounts, much of it **short-term**, denominated in **foreign currency**, and unhedged.
- As time went on, the inflow of foreign capital tended to be used to finance poorer-**quality** investments.

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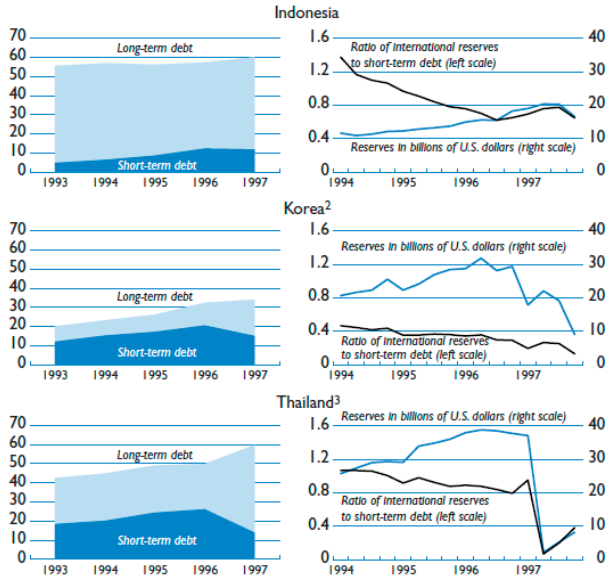
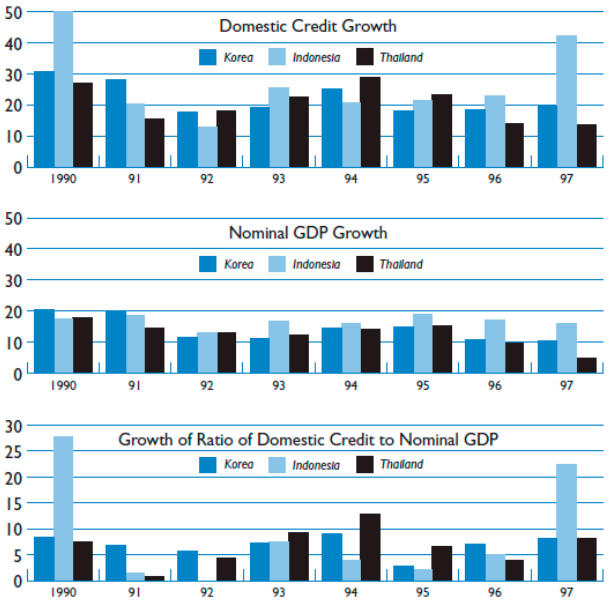


Sources: International Monetary Fund, *International Financial Statistics* and *World Economic Outlook*; and IMF staff estimates.

[1]External debt figures are in percent of GDP. Gross reserves exclude gold.

[2]Debt figures include offshore borrowing of domestic financial institutions and debt contracted by overseas branches of domestic financial institutions. Reserves exclude deposits at overseas branches and subsidiaries of domestic banks.

[3]Reserves figures for the last three quarters of 1997 are net of forward operations.



Sources: International Monetary Fund, *International Financial Statistics*; data provided by the authorities; and IMF staff estimates.

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- Inadequate financial sector supervision
- Poor assessment and management of financial risk
- Lack of transparency in corporate and fiscal accounting and the provision of financial and economic data.

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- The crisis erupted in Thailand with a series of attacks on the baht
- Contagion spread rapidly to other economies in the region that seemed vulnerable to an erosion of competitiveness after the devaluation of the baht or were perceived by investors to have **similar** problems.
- As the contagion spread to Korea, the world's eleventh largest economy, the possibility of a default by Korea raised a potential threat to the international monetary system.

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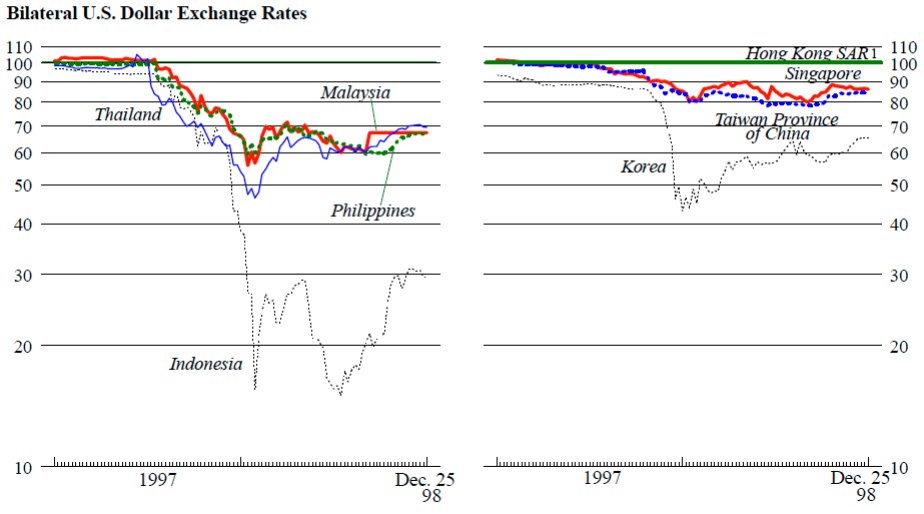
Figure 1. Selected Asian Economies: Bilateral U.S. Dollar Exchange Rates and Equity Prices

(In U.S. dollars per currency unit; logarithmic scale; January 5, 1996 = 100)



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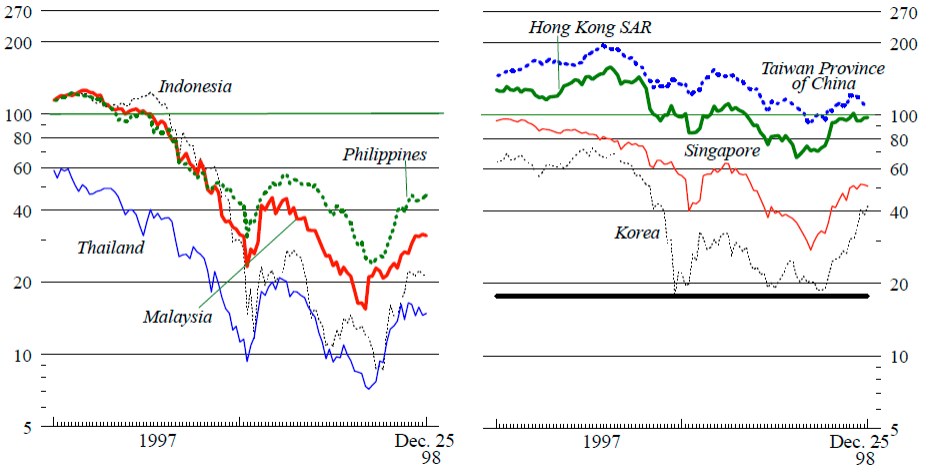
Equity Prices



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II. Balance Sheet Approach and the European crisis

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Financial System Analysis

- It is now widely accepted that the financial system can *cause* or *amplify* macroeconomic crises
- Regular surveillance of the financial conditions of households, the government, and financial and non-financial corporations is necessary to:
  - Understand how entities are managing risks
  - Identify sector-wide or systemic vulnerabilities
  - Gauge the importance of those vulnerabilities
  - Assess regulatory and supervisory structures

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Balance sheets

- Financial system analysis starts with an assessment of balance sheets of various sectors – public sector, household sector, financial sector, non-financial businesses.
- Measures are used for identifying **risks** associated with mismatches in maturities, currencies, capital structures, as well as insolvency (negative net assets).

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What is Risk?

- Risk is an exposure to an **uncertain outcome** associated with holding financial assets

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Types of Risk

- ***Credit Risk*** is possible loss from a fall in **credit quality** or **default** of a borrower
- ***Market Risk*** is possible loss from changes in financial prices (foreign exchange risk, interest rate risk, equity price risk, commodity price risk)
- ***Liquidity Risk*** is the inability to roll over debt or to liquidate assets in order to raise cash
- **Operational Risk**: inadequate systems, management failures, fraud, human error
- **Legal and Regulatory Risk**: uncertainty about changes in codes, regulations, laws
- **Business Risk**: uncertainty about demand for products

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Credit Risk

- *Default risk* —the risk that obligors or counterparties will not able to fulfill their obligations
- *Spread risk*—deterioration in the borrower's credit rating/standing.
- How can macroeconomic changes be mapped into credit risk provisioning and credit losses?
- What is the impact on bank **profits** and bank **balance sheets**?

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Banking Sector Vulnerabilities

- The objective is to identify warning signs associated with various risks
- We will look at various indicators in the afternoon workshop.

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Financial Soundness Indicators

- **FSIs** are a standard part of the Financial Sector Assessment Program (FSAP) and Article IV missions
- Often the banking sector is decomposed into different types of banks:
  - Public banks
  - Private banks
  - Foreign banks
- Note also the important role of **nonbank financial institutions** in many crisis situations

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The Balance Sheet Approach (BSA)

- The BSA uses separate balance sheets for government, financial sector, corporate sector and households to ….
- Construct a matrix that shows the claims that each sector has on other sectors
- Broken down by **currency and maturity structure**
- The "rest of the world" sector shows the foreign asset and foreign liability positions of each sector and the aggregate net foreign asset position of the country as a whole

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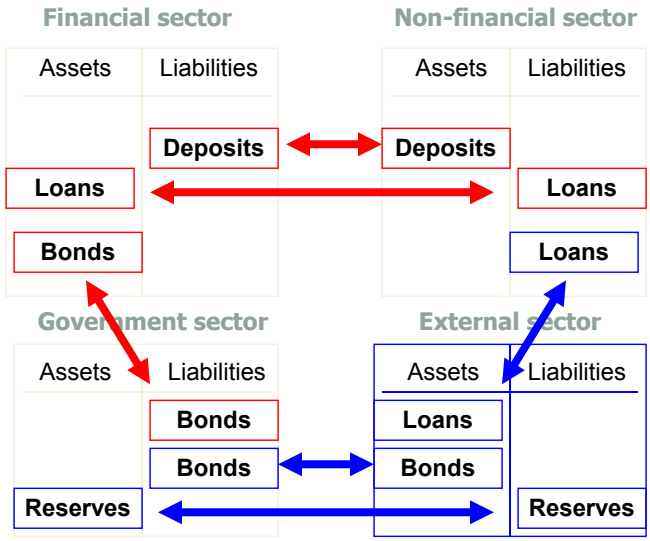
Sectoral balance sheets and their **main** interlinkages



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BSA: Liquidity Assessment and Maturity Mismatch

- If the net short-term position (short-term assets minus short-term liabilities) is different from zero, there is a **maturity mismatch**.
- ***Banks***: vulnerability arises because assets are mainly long-term and liabilities are short-term
  - an **increase** in interest rates will reduce the present value of (long-term) assets more than that of (short-term) liabilities, reducing net worth.
  - put differently, banks will have to roll-over deposits at higher rates while the return on loans is locked-in at lower rates; thus, profitability declines.
- ***Insurance Companies***: vulnerability arises because liabilities are mainly long-term while assets are shorter-term
  - a ***decline*** in interest rates reduces net worth.

Interpreting the European Crisis with BSA

- From a Real estate market crisis to a banking crisis.
- From a banking to an economic crisis.
- From a banking and economic crisis to a sovereign debt crisis.
- The end of the story?

. The subprime crisis explained via the BSA.

Real estate bubble – non-financial BS
Then financial sector BS --- Banking crisis
Then Government BS --- Sovereign debt crisis

Then…. Resurgence banking, currency,..

History

- Business cycle turning point in early 2007.
- Real estate bubble explodes.
- Financial institutions faced liquidity problem (Northern Rock, Bear Stearn, Freddy Mac, Fanny Mae,…)
- Bankruptcy of Lehman brothers.

Sept 15th, 2008 - Systemic Banking crisis

- Irrational reaction of stock markets, which crashed.

- Several financial institutions in Europe faced liquidity problems (fortis, dexia,..). Nobody believe anymore in the IFS.

- Uncoordinated reaction of governments (Paulson's plan, recapitalization, nationalization)

- G20 meeting to restore credibility.

History 2/

- Real economy collapse since 2009.

- Public finance, austerity measures.

- Greek default, downgrade of US, France, banking distress…

Then a vicious circle? Moderate growth?

What do you think ?

Take aways

. Banking/Financial markets present multiple risks.

. Crises can occur either because of bad macroeconomic fundamental either because of non fundamental factors (self-fulfilling propheties, contagion, moral hazard).

. BSA consider all the sectors of an economy and all the potential mutations among them.

Group Questions

Define and describe a "financial crisis" (using the Asian example)?

How does the Balance Sheet Approach (BSA) help to understand the current crisis in Europe?

Detail the policy responses to a banking crisis, according to the BSA?

Institute for Capacity Development IMF
East Africa Technical Assistance Center (AFRITAC)

Regional Course on Macroeconomic Diagnostics

Dar Es Salaam, Tanzania
November 30–December 10, 2015

Program[1]

Monday, November 30

8:30 a.m. – 9:00 a.m.		**Administrative Briefing**
9:00 a.m. – 10:00 a.m.		**Opening Session /Welcoming Remarks** Mr. Sukhwinder Singh, Head of East AFRITAC and Ms. Irina Yakadina, Senior Economist, African Division, Institute for Capacity Development, IMF
10:15 a.m. – 12:15 p.m.	**L-1**	**Domestic Demand** Lecture by Ms. Yakadina • Data and measurement issues in calculating GDP • Analyzing private investment and consumption
1:15 p.m. – 1:45 p.m.	**C-1**	**Case Study: South Africa—Introduction** Presentation by Mr. Fazeer Sheik Rahim, Technical Assistance Officer, AFRITAC East
1:45 p.m. – 4:30 p.m.	**W-1**	**Domestic Demand** Workshop Facilitated by Counselors Mr. Dmitriy Rozhkov, Senior Economist, African Division, Institute for Capacity Development, IMF, Mr. Sheik Rahim, and Ms. Yakadina

Tuesday, December 1

[1] *Unless otherwise stated, coffee breaks will be held from 10:30 a.m.–10:45 a.m. and from 2:45 p.m. – 3:00 p.m. Lunch will be served from 12:15 p.m. – 1:15 p.m.*

9:00 a.m. – 12:15 p.m.	**L-2**	**Supply and Productivity** Lecture by Ms. Yakadina • Estimating potential output • Measuring contributions to output of capital, labor and total factor productivity
1:15 p.m. – 4:30 p.m.	**W-2**	**Supply and Productivity** Workshop Facilitated by Counselors
Wednesday, December 2		
9:00 a.m. – 12:15 p.m.	**L-3**	**Analyzing Inflation** Lecture by Mr. Sheik Rahim • Measuring headline and core inflation rates • Inflation and its determinants
1:15 p.m. – 4:30 p.m.	**W-3**	**Analyzing Inflation** Workshop Facilitated by Counselors
Thursday, December 3		
9:00 a.m. – 12:15 p.m.	**L-4**	**Analyzing Fiscal and Monetary Policy** Lecture by Mr. Sheik Rahim • Analysis of fiscal and monetary policy • Measures of fiscal stance • Short-term indicators for monetary policy
1:15 p.m. – 4:30 p.m.	**W-4**	**Analyzing Fiscal and Monetary Policy** Workshop Facilitated by Counselors
Friday, December 4		
9:00 a.m. – 12:15 p.m.	**L-5**	**Fiscal Sustainability** Lecture by Ms. Yakadina • Public debt dynamics • Assessing fiscal sustainability
1:15 p.m. – 4:30 p.m.	**W-5**	**Fiscal Sustainability** Workshop Facilitated by Counselors
Monday, December 7		

9:00 a.m. – 12:15 p.m.	**L-6**	**Assessing the External Position** Lecture by Mr. Rozhkov • Estimating the underlying current account • Calculating reserve adequacy ratios and the composition of external debt • External debt sustainability analysis
1:15 p.m. – 4:30 p.m.	**W-6**	**Assessing the External Position** Workshop Facilitated by Counselors
Tuesday, December 8		
9:00 a.m. – 12:15 p.m.	**L-7**	**Competitiveness and the Exchange Rate** Lecture by Mr. Rozhkov • Nominal and real exchange rates: definitions and methods of calculations • Assessing the equilibrium real exchange rate
1:15 p.m. – 4:30 p.m.	**W-7**	**Competitiveness and the Exchange Rate** Workshop Facilitated by Counselors
Wednesday, December 9		
9:00 a.m. – 10:30 a.m.	**L-8**	**Assessing the Financial System** Lecture by Mr. Rozhkov • Assessing private sector balance sheets • Balance sheet approach
10:45 a.m. – 12:15 p.m.	**W-8**	**Assessing the Financial System** Workshop Facilitated by Counselors
1:15 p.m. – 4:30 p.m.	**O-1**	**Preparation of Group Presentations**
Thursday, December 10		
9:00 a.m. – 10:15 a.m.	**O-1**	**Preparation of Group Presentations**
10:30 a.m. – 12:00 p.m.	**O-2**	**Presentations and Discussions of Group Work** Plenary Session chaired by Mr. Sheik Rahim
12:00 p.m. – 12:15 p.m.		**Discussion of Course Evaluations** Chaired by Mr. Rozhkov

12:15 p.m. – 1:15 p.m.	**Closing Session and Presentation of Certificates** Chaired by Ms. Yakadina