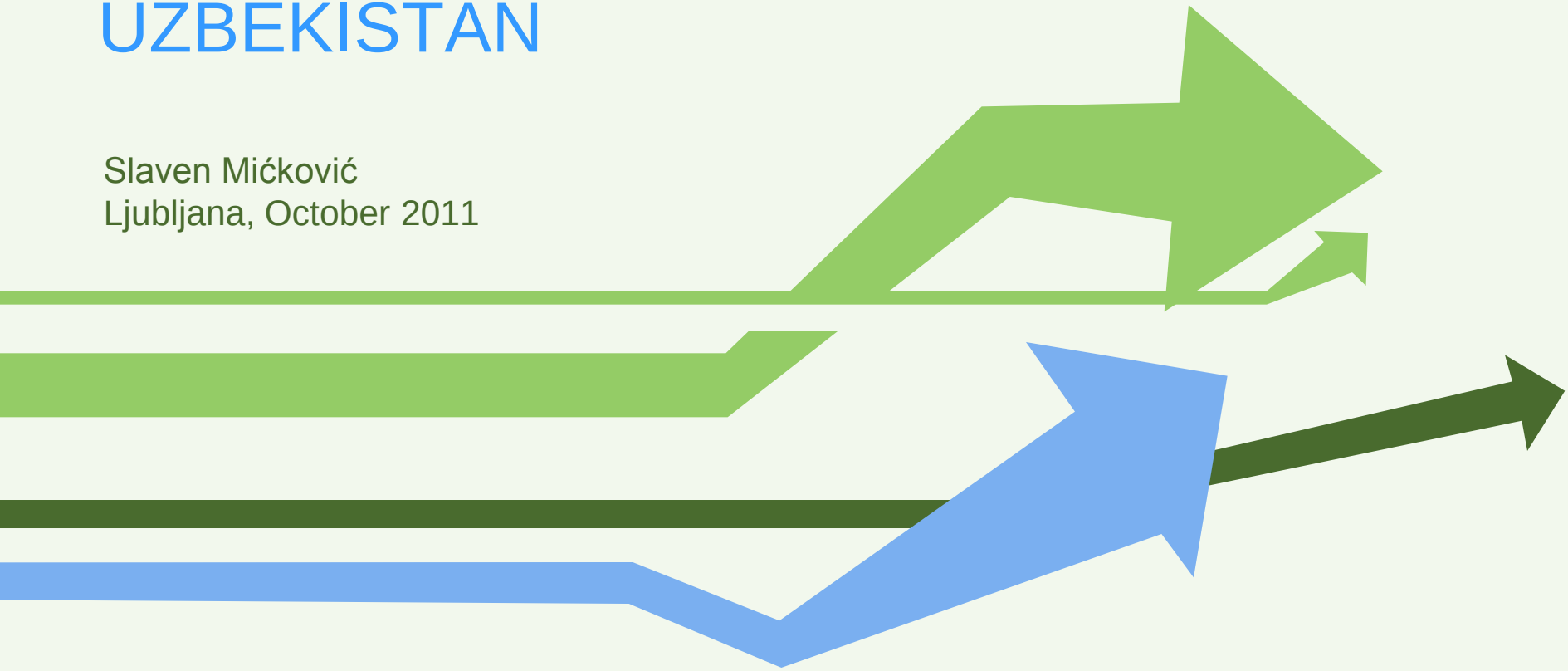
STUDY TOUR TO SLOVENIA FOR OFFICIALS FROM THE MoF OF UZBEKISTAN

Slaven Mićković
Ljubljana, October 2011



2. PART: IMPACT OF ECONOMIC ACTIVITY ON FISCAL POSITION

IMPACT OF ECONOMIC ACTIVITY ON FISCAL POSITION

- The Situation & the Solution: most fiscal policy decisions have economic and budgetary implications which go well beyond the year in which they are taken - medium-term budgetary targets should take into account cyclical fluctuations of economy.

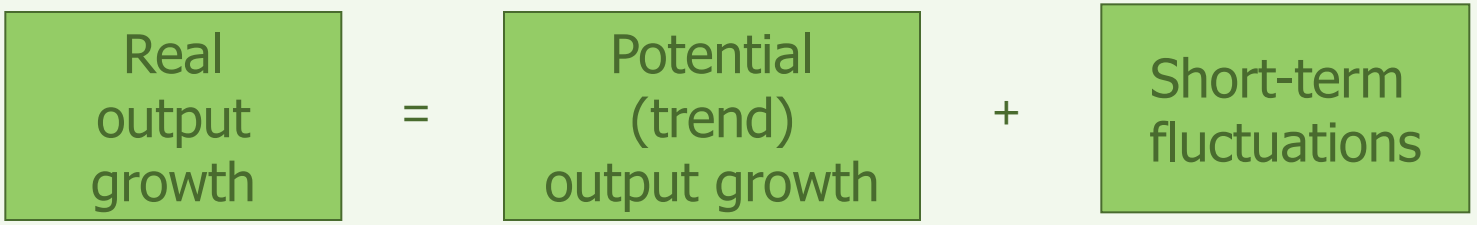
Macroeconomic Background

- Modern economies undergo significant short-run variations in aggregate output and employment:
  - variations do not exibit any simple regular or cyclical pattern;
  - variations are distributed very unevenly over the components of of output;
  - there are no large asymmetries between rises and falls in output: output growth is distributed roughly symmetrically around its mean;
  - output seems to be characterized by relativly long periods when it is slightly above its usual path and short periods when it is relatively far below.

Macroeconomic Background

- Economies may suffer temporary downward movements during business cycles, but they tend to experience long-term growth characterized by sustained increase in total GDP and GDP per capita.
- Over the long run the level of output is determined not by demand, but by the supply of factors of production (capital, labor, and technology).
- These factors of production determine a “potential rate" of output, around which business cycles and macroeconomic policies can cause only temporary fluctuations.

Macroeconomic Background



- The output path can be affected by:
  - **Permanent shocks** have a long-lasting effect on the output path,
  - **Temporary shocks** - their effect vanishes over time - they result in cyclical movements of actual output around trend/potential

Macroeconomic Background

- Potential output / the trend growth in the productive capacity of the economy is an estimate of the level of GDP attainable when the economy is operating at a high rate of resource use.
- Potential output is not a technical ceiling on output that cannot be exceeded: it is a measure of maximum sustainable output - the level of real GDP in a given year that is consistent with a stable rate of inflation.
- Potential output constitutes the best composite indicator of the aggregate supply side capacity of an economy and of its scope for sustainable, non-inflationary, growth.

Macroeconomic Background

- Output gap (OG) - the difference between the actual and the potential output is the measure of the cyclical fluctuations.
- A positive number for the gap indicates excess demand and a negative number indicates excess capacity.
- Potential output and the output gap are unobservable in practice: they cannot be easily embedded in robust and unquestionable quantitative indicators.

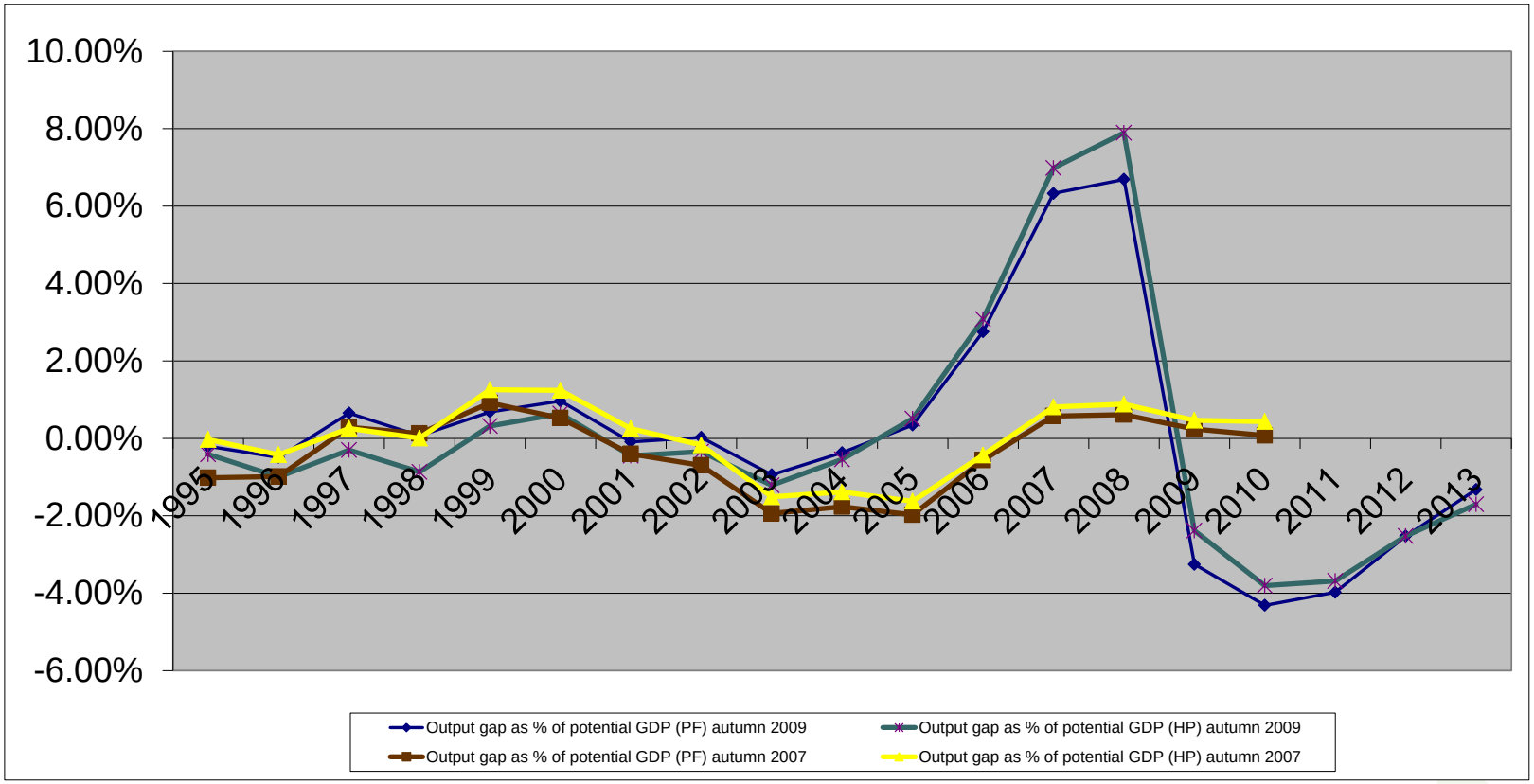
Macroeconomic Background

- Government's actual budget balance reflects the influence of both temporary and permanent factors.
- In order to assess and to formulate proper medium-term fiscal policies it is important to know how economic activity affects fiscal position.
- It is considered important to know what part of government balance:
  - is due to temporary changes of the economy (cyclical fluctuations) and what part
  - corresponds to the trend (potential) output and shows the consequences of the acts of the fiscal autorities?

Macroeconomic Background

- The concepts of potential output and the "output gap" have played an increasing role in assessing the stance of macroeconomic policies.
- Potential output and output gap estimates are in particular largely used in EU macroeconomic surveillance procedures as they provide an essential input for calculating indicators of structural (i.e. cyclically adjusted) fiscal balance.

Output Gap - SLOVENIA



Macroeconomic Background

- The importance of the Output Gap for Economic Policy Making:
  - Analysis of Cyclical Fluctuations:
    - Position in business cycle, turning points and forecasting
  - Structural Policies:
    - Information on the productive capacity and its determinants: micro policies
  - Monetary Policy:
    - Inflation implications of ΔY^*
    - Taylor Rule
  - Fiscal Policy
    - Structural Budget Balance important for debt sustainability
    - Fiscal safety benchmarks to avoid excessive deficits

IMPACT OF ECONOMIC ACTIVITY ON FISCAL POSITION

1.1. Estimation of Potential Output Growth / Output Gap
1.2. Estimation of the Budget Elasticities
1.3. Estimation of the Cyclically-Adjusted Budget Balance
1.4. Calculating Minimum Benchmarks
1.5. Fiscal Stance over the Cycle (pro-cyclical / counter-cyclical behavior of Fiscal policy)

Estimation of Potential Output Growth / Output Gap

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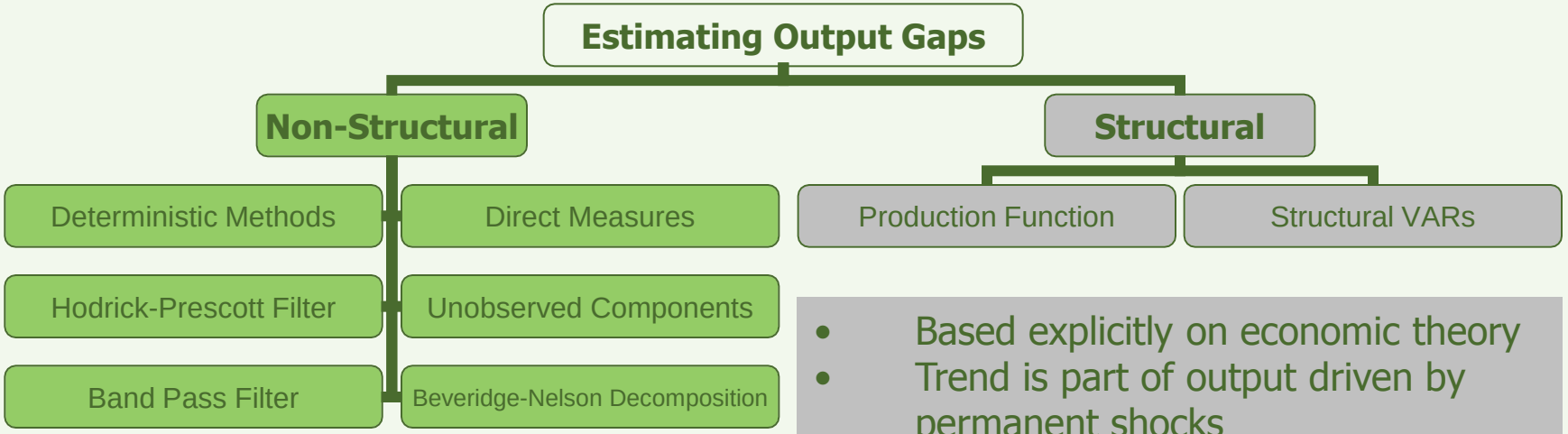
Approaches to the Output Gap Estimation



- Based on statistical assumptions on the time series properties of trends and cycles
- Trend is part of output with certain time series properties

- Based explicitly on economic theory
- Trend is part of output driven by permanent shocks
- Identifies structural determinants of potential output in terms of inputs

Cobb Douglas Production Function

- It is important to analyze the relationship between potential output and its structural determinants through a production function.
- Time series methods (non-structural) do not give an insight view into a production process of the economy.
- This framework is useful for explaining the key economic forces underlying developments in output and growth in the medium term.

Cobb Douglas Production Function

- Estimating potential output through production function leads to several open questions:
  - First, there is no reliable measure on physical capital stock, and there is no existing measure of potential physical capital stock (or capacity utilization);
  - Second, the same problem appears when we try to estimate potential human capital stock;
  - Third, technological progress is calculated as a residual from the production function and therefore it is hard to find a method to model potential technological progress.
- We must rely on deriving measures of the trend components of the inputs (physical and human capital stock, technological progress).

Cobb Douglas Production Function

- The C-D production function represents the GDP (Y) as a combination of factor inputs – labour (L) and capital (K) – corrected for the degree of excess capacity (U_L ,U_K) and adjusted for the level of efficiency (E_L ,E_K).
- Potential GDP is given by
- $Y = (U_L L E_L)^{\alpha}(U_K K E_K)^{1-\alpha} = TFP \bullet L^{\alpha} \bullet K^{1-\alpha}$

Cobb Douglas Production Function

- Total factor productivity encompasses both the degree of excess capacity correction and the adjustment for the level of efficiency.

$$TFP = (E_L{}^{\alpha} E_K{}^{1-\alpha})(U_L{}^{\alpha} U_K{}^{1-\alpha})$$

Cobb Douglas Production Function

- The estimated business-sector production function is assumed to be of the form:

$$\ln Y = \ln A + \alpha \ln N + (1-\alpha)\ln K + \ln E$$

i.e.

$$y = a + \alpha n + (1-\alpha)k + e$$

where:

Y = business-sector value added

N = actual business-sector labour input

K = actual business-sector capital input (excluding housing)

A = total factor productivity

α = average labour share parameter

E = error term

(lower-case letters indicate natural logarithms)

Cobb Douglas Production Function

- Actual value added in the government sector is taken to be equal to potential output in that sector.
- Potential output for the whole economy is finally obtained by adding actual value added in the government sector to business-sector potential output.

Cobb Douglas Production Function

- Advantages:
  - Economic foundation and interpretation
  - Information on determinants of potential output
  - Output gap not assumed symmetric
  - Avoids arbitrary statistical assumptions

Cobb Douglas Production Function

- Disadvantages
  - Needs extensive information and theoretical assumptions
  - Still uses filters for factor inputs
  - Structural Breaks problematic for production function
  - Factor inputs imprecisely measured

Estimating Output Gap with HP Filter

- Fit a long term symmetric moving average process to detrend output.
- Within $y_t = y_t^* + y_t^C$ we choose $\{y_{t^*}\}$ to minimise the variance of y_t^C subject to a penalty for variations in trend changes:

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

Minimise gap between actual and trend value

Weight to trade off smoothness with fit

Minimise change in trend value

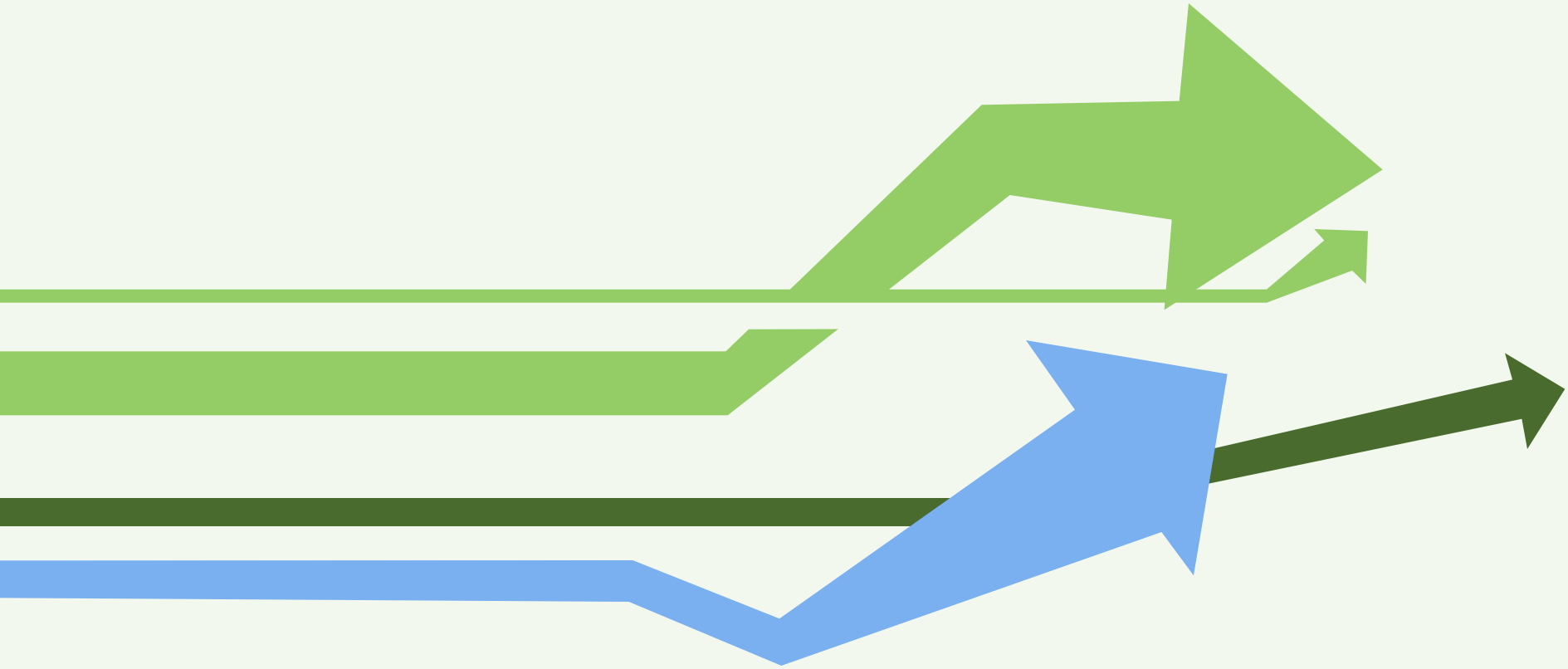
Estimating Output Gap with HP Filter

- Importance of λ
  - Subjective decision
  - Determines smoothness of trend:
    - Smaller λ → trend follows actual output closer
    - Larger λ →trend deviates from actual output
    - Limits: λ is zero (Yt=Yt*) and λ is infinity (linear trend)
  - Common choice: quarterly λ=1600, annual λ=100
- The Most Popular Method

Estimating Output Gap with HP Filter

- Important Problems:
  - End Point Bias
    - Distribution of λ only symmetric in midde of sample: skewed at end; therefore the current position in the cycle is crucial: if in recession, trend is strongly downward biased $\rightarrow Y_t^*$ chiefly determined by actual values in those years
    - Solution: extend series with forecasts!
  - Structural Breaks
    - Moving average structural breaks are spread around break point
    - Solution: nothing satisfactory, try to fit two trend lines
  - Statistical Problems
    - Mechanical de-trending can induce spurious cycles
    - Optimal filter only under special circumstances (cf. Harvey and Jaeger 1993)

Estimation of the Budget Elasticities



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The Concept of Elasticity

- Responsiveness measures: we are asking what the change in the dependent variable is expected to be when we change the value of independent variable!
- Revenues and expenditures responsiveness matters for lots of fiscal policy analyses.
- A unit free measure: elasticities allow to quantify the differences among countries without standardizing the units of measurement!
- Measurment of the percentage change in one variable that results from 1% change in another variable.

The Concept of Elasticity

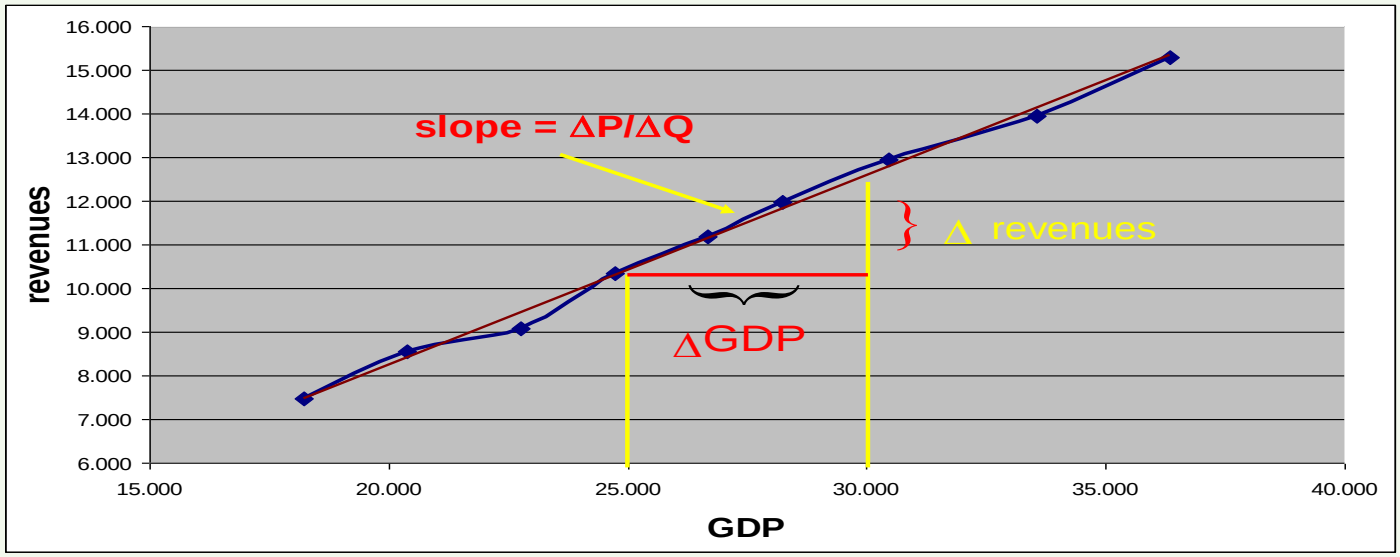
- The elasticity of Y with the respect to X is:

  elasticity = (% change in Y)/(% change in X) =

  = (ΔQ/Q)/(ΔP/P) = dlnQ/dlnP

- Size of budget elasticities:
  - unit elastic: elasticity equal to 1
  - inelastic: elasticity less than 1
  - elastic: elasticity greater than 1

The Concept of Elasticity



- slope = $\Delta P / \Delta Q$
- 1 / slope = $\Delta Q / \Delta P$
- elasticity = (P/Q)(1/slope)

The Concept of Elasticity

- Slope compared to elasticity:
  - the slope measures the rate of change of one variable in terms of another;
  - the elasticity measures the percentage change of one variable in terms of another.
- Elasticities are either estimated with econometric regressions or derived from tax and expenditure laws and from detailed information on the distribution of income and revenue.

Estimation of the budget elasticities

- **REVENUES**: four tax categories:
  - Personal income tax (PIT)
  - Corporate tax (CIT)
  - Social security contributions (SSC)
  - Indirect taxes (IND)

Estimation of the revenue elasticities

- ε_R is weighted average revenue elasticity from the elasticities of the four revenue categories

$$\varepsilon_R = \frac{PIT}{R}\varepsilon_{PIT,Y} + \frac{CIT}{R}\varepsilon_{CIT,Y} + \frac{SSC}{R}\varepsilon_{SSC,Y} + \frac{IND}{R}\varepsilon_{IND,Y}$$

Estimation of the expenditure elasticities

- Only unemployment benefits are affected by the bussines cycle.
- To estimate the elasticities of unemployment related expenditures with respect to output we follow :

$$\beta = \varepsilon_{U,Y} \times \varepsilon_{UE,U}$$

$\varepsilon_{U,Y}$ - elasticity of the unemployment rate to output (inverse Okun coefficient[1])

$\varepsilon_{UE,U}$ - elasticity of unemployment benefits with respect to the unemployment rate

- The elasticities are obtained by regression models with the categories expressed in logarithms.

[1] Okun's law describes an inverse relationship between the change in the rate of unemployment and the difference between actual and potential GDP.

Estimation of the Cyclically-Adjusted Budget Balance

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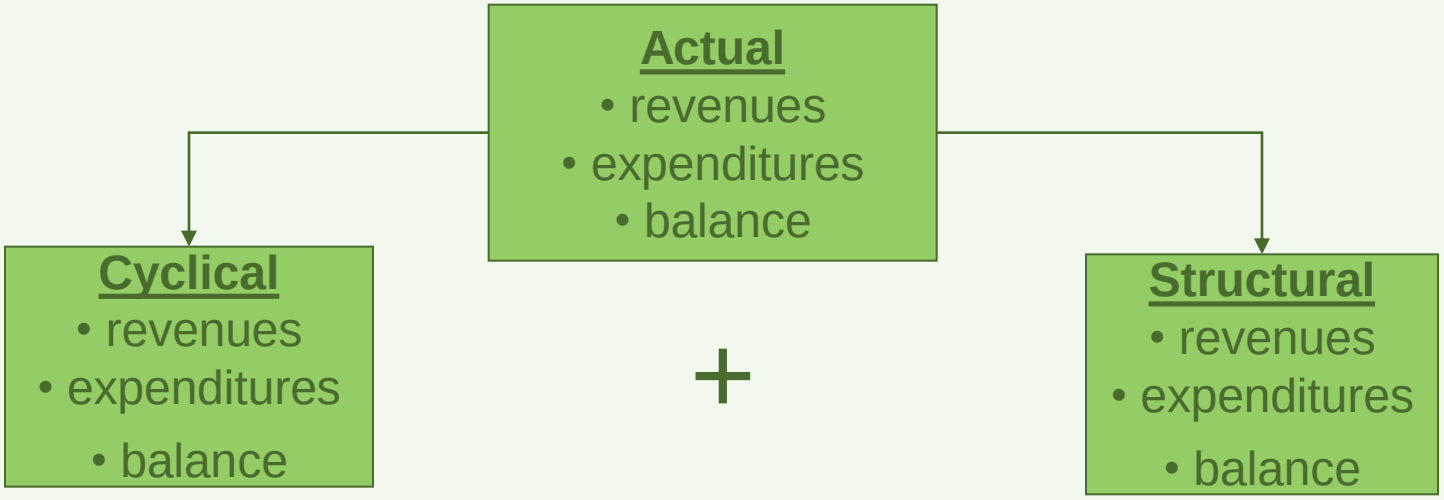
Cyclical sensitivity of the fiscal position



- Changes in actual budget balance (revenues and expenditures) include structural changes in public finance (long-term trend) AND changes that stem from the economic cycles (short-term fluctuations).
- Usually budget balances are expressed as a share of GDP.

Cyclical sensitivity of the fiscal position

- Revenues and expenditures do not change proportionally to the change in the GDP, so the short-term impact of the economic cycle on public finance is important – measured by cyclical BB.
- The cyclical contributions of the economy to the BB should net out over the cycle (positive at peak cycle and negative at the trough).
- From the fiscal policy point of view - passive part of the budget: Cyclical part of the balance constists of the taxes and spending that react automatically to the state of the economy.

Cyclical sensitivity of the fiscal position

- Determining factors:
  - The size of the government sector
  - The tax structure (the higher the taxation of cyclically sensitive tax bases the more the revenues will vary with the business cycle)
  - The progressivity of taxes
  - The generosity of unempolyment benefits
  - The cyclical sensitivity of various tax bases and unemployment

Cyclical sensitivity of the fiscal position

- The cyclically-adjusted BB (CAB) / structural BB shows at what level the government revenues and expenditures would be if the economy was operating at its trend/potential level

  ➡ this component of the BB corresponds to the trend growth path of the economy.

- From the fiscal policy point of view - active part of the budget: CAB consists of the discretionary programs enacted by the legislature.

Cyclical sensitivity of the fiscal position

- The use of the CAB in budgetary surveillance:
  - it makes it possible to gauge the underlying budgetary position by isolating the temporary components ensuing from cyclical developments; as it takes into account the degree of 'normal' cyclical fluctuations, the CAB is also helpful for assessing the 'risks' of breaching a predefined threshold;
  - it allows an assessment of budgetary adjustments over time, disentangling budgetary improvements due to policy measures from those resulting from cyclical developments;
  - it is used for determining whether the stance of fiscal policy is expansionary or contractionary.

Cyclical sensitivity of the fiscal position

- CAB provide compliance with the SGP rules:
  - SGP implicitly acknowledges the need to distingusih between the cyclical and structural part
  - Preventive part - early warning mechanism, safety margin and CTBOIS rule (expressed in structural terms)
  - Corrective part - excessive deficit procedure and sanctions

Cyclical sensitivity of the fiscal position

- Improving structural budget and lowering budget balance *per se* - CAB enables:
  - The analysis of short-term policy stance including analysis of the operation of the automatic fiscal stabilizers (AFS);
  - Medium term budget planning and control;
  - Pursuit of continuity and stability in budget making.

Cyclical sensitivity of the fiscal position

- Controlling the development of the government debt:
  - The CAB shows the rate of cyclically-adjusted debt accumulation.
  - Beyond short–term business cycle fluctuations even a fiscal position of close balance in medium term may not be sufficient to exclude the risk of ever increasing debt levels.
  - Letting the AFS work asymmetrically (working during the recessions and not during the upturn) results in growth of the government debt.

Cyclical sensitivity of the fiscal position

- Drawbacks of the Cyclically-Adjusted Indicator:
  - CAB includes also the irregular components
  - Potential output cannot be observed – the estimate is method-dependent .
  - Any real-time indicator measuring the cyclical position such as the output gap involves projections about current and future development and hence, will be subject to revisions: the exact cyclical position at a given point in time is revealed only ex-post, while the indicator is used to inform policy action on a forward-looking basis.

Estimation of the CAB

- The estimation of the CAB steps:
  1. Estimation of potential output and output gap.
  2. Estimation of the budget elasticities and sensitivities.
  3. Estimation of the cyclical component.
  4. Calculation of the CAB.

Estimation of the CAB

- The CAB is the difference between the budget balance and the cyclical component.
- The cyclical component is given by the product of the sensitivity of the budget balance (η) times the output gap (OG):

$$CAB = BB - CC = BB - \eta \cdot OG$$

where the output gap (OG) is defined as the percentage difference between actual (Y^R) and potential (Y^{RP}) GDP, both expressed in real terms, i.e. $(Y^R - Y^{RP}) / Y^{RP}$

Estimation of the CAB

- The budget sensitivity η is given by the difference between the sensitivities of revenues (η_R) and of expenditures (η_G):

  $\eta = \eta_R - \eta_G$
- The sensitivities of revenues and expenditures are given in turn as the product of the corresponding elasticities times the share of public revenues and expenditures in GDP:

  $\eta_R = \varepsilon_R$ R/Y & $\eta_G = \varepsilon_G$ G/Y

  where ε_R and ε_G denote, respectively, the elasticities of revenues (R) and expenditures (G) with respect to output.

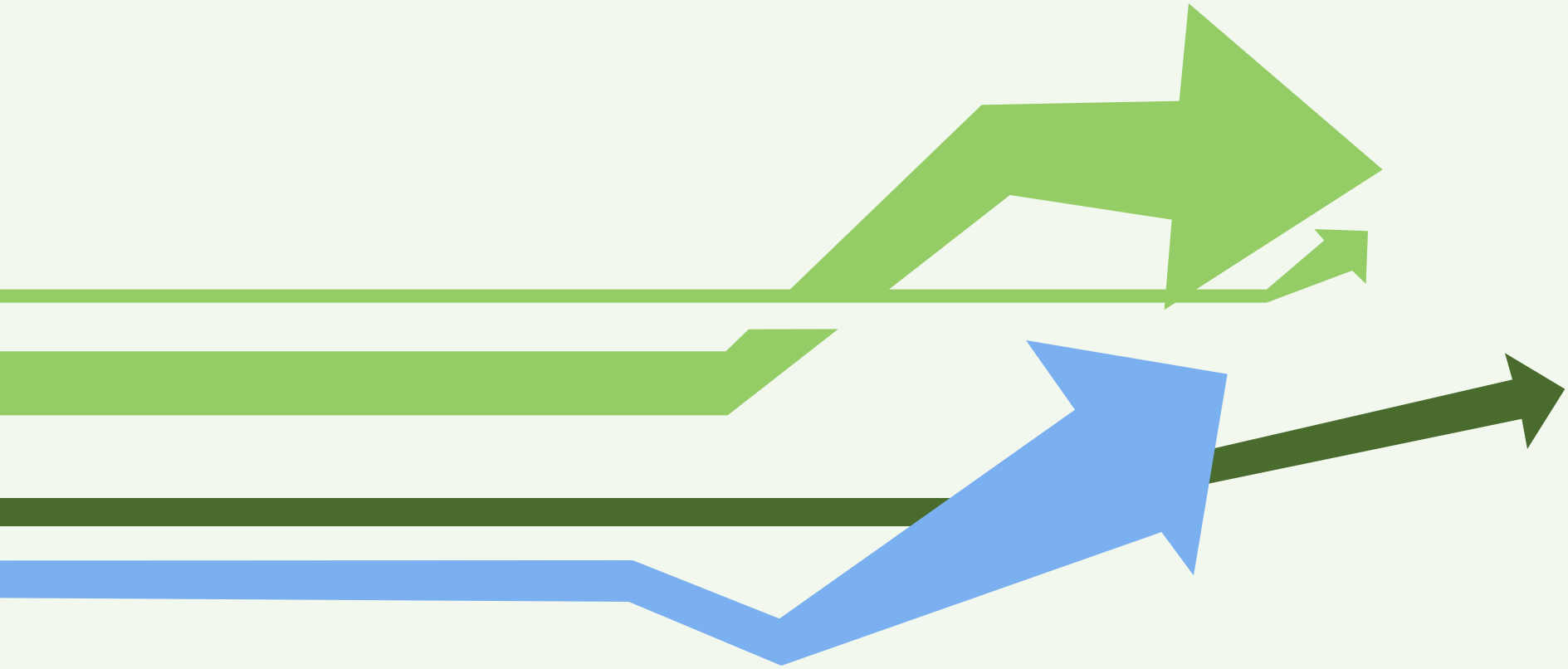
Estimation of the CAB

- Budgetary sensitivity parameters η represents a marginal change in the level of the budget balance BB with respect to a change in the level of GDP Y i.e.

  $\eta = \partial BB / \partial Y$

- Consequently, the CAB approximates the budget balance net of cyclical components expressed in percentage points of actual GDP.

Calculating Minimum Benchmarks



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Calculating Minimum Benchmarks

- The minimal benchmark corresponds to the cyclically-adjusted budget balance which allows a country to let automatic stabilisers work freely without risking to breach the 3% of GDP reference value under normal cyclical circumstances.

Calculating Minimum Benchmarks

- The minimal benchmark (MB) is calculated in two steps:
  - First, a safety margin against the 3% ceiling is calculated by multiplying the budgetary sensitivity (η) by a "representative output gap" (ROG), which captures the value of the output gap that would materialise under particularly weak, yet still typical, cyclical conditions.
  - In the second step, the minimal benchmark itself is obtained by deducting the safety margin from the 3% deficit ceiling, so that, $MB = -3 - \eta ROG$

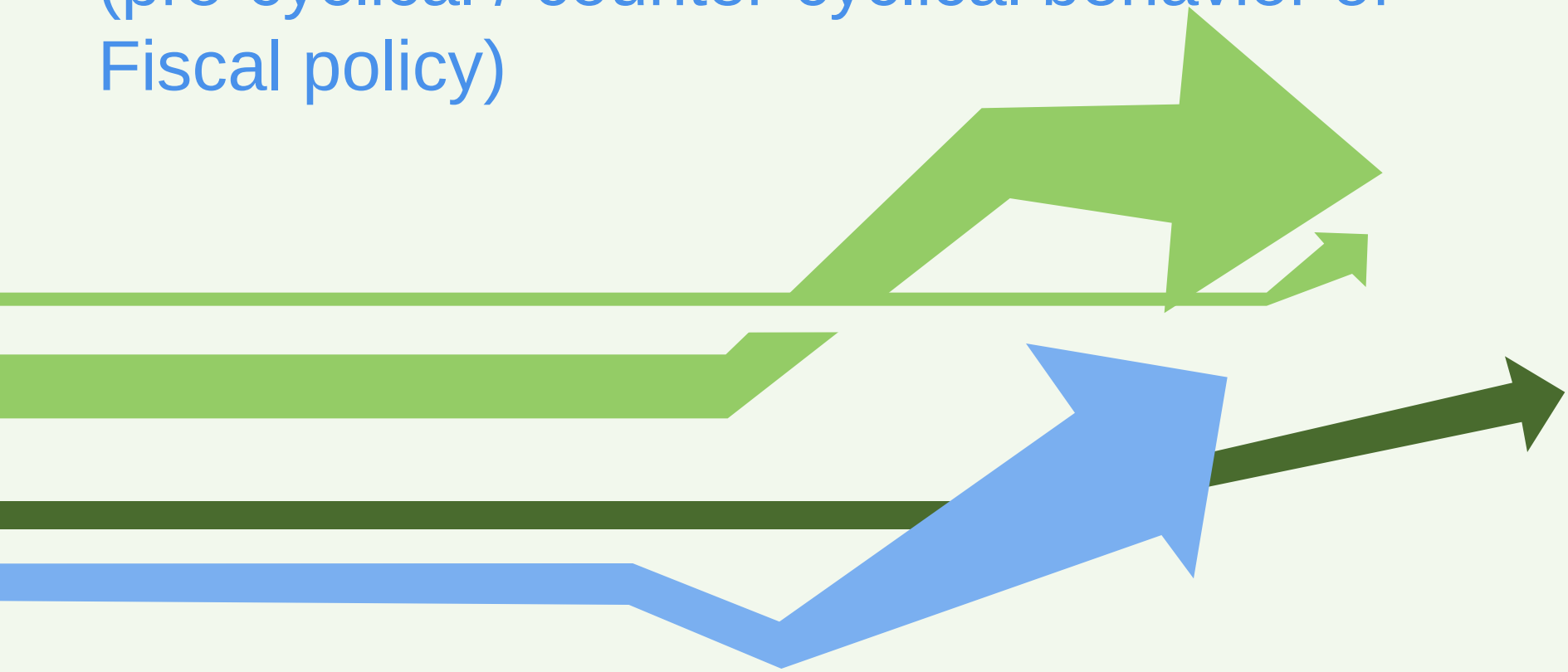
Calculating Minimum Benchmarks

- The ROG is computed as the simple average between the highest and lowest of the three following alternatives:
  - The largest negative output gap observed for the Member State concerned in the period considered.
  - The unweighted average of the largest negative output gaps in EU Member States observed in the period.
  - Two times the standard deviation of the output gap taken with minus sign[2].

[2] When output gaps are normally distributed, about 95 % of the observations fall within the range of two times the standard deviation around the mean. Thus, since the average value of output gaps is close to zero, only about 2.5 % of the observations fall below a value of the output gap equal to -2 times the standard deviation.

Fiscal Stance over the Cycle

(pro-cyclical / counter-cyclical behavior of Fiscal policy)

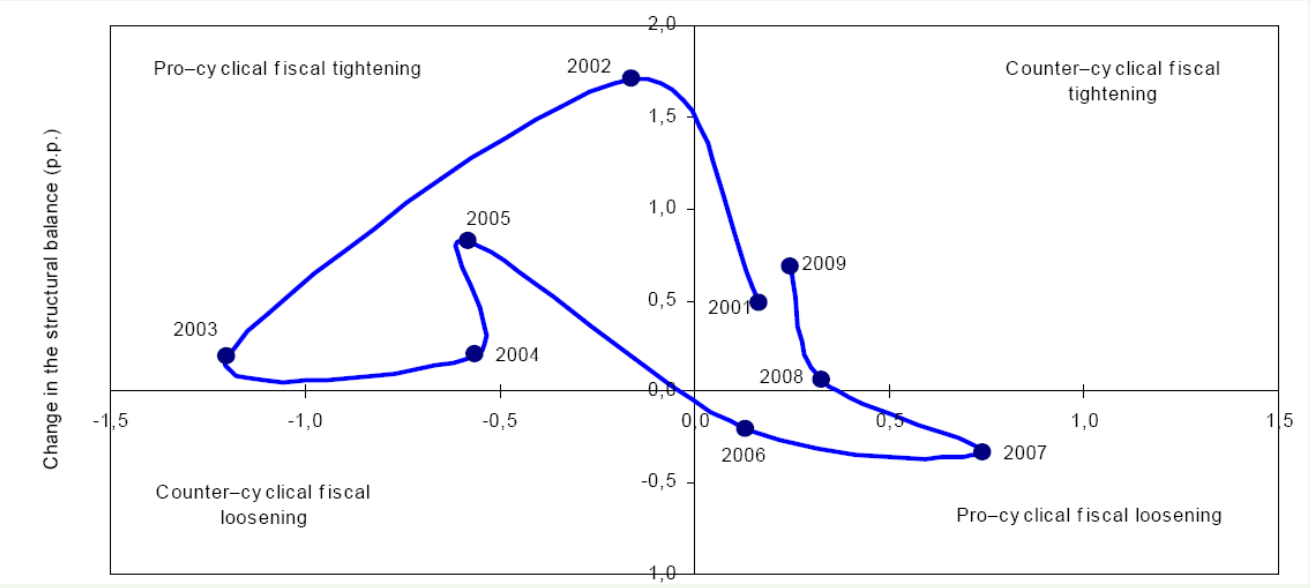


Fiscal Stance over the Cycle

- Changes in the primary CAB (net of interest payments) are often used to measure the stance of fiscal policy.
- In fact, changes in the CAB are the most commonly used indicator of whether government is actively taking expansionary or restrictive measures.
- The use of the CAB as an indicator of fiscal impulse dates back to the time when the Keynesian view dominated the economics profession.
- The role of fiscal policy in the management of aggregate demand rested on the assumption that current income was the key factor driving private consumption expenditure, and that expectations about the future play no role.

Fiscal Stance over the Cycle

- If we compare the fiscal stance (approximated by the changes in the CAPB) and cyclical conditions (approximated by the size of the output gap) over the same period, we can examine the cyclicality / orientation of fiscal policy.



Fiscal Stance over the Cycle

- According to changes in the fiscal stance, we can divide graph into four quadrants that determine the fiscal orientation:
  - Fiscal policy is counter-cyclical if the combination of both parameters lies in the first or the third quadrant: This means that fiscal policy is expansive if GDP growth falls below potential, and restrictive if GDP growth is above potential.
  - The combination of both parameters in the second or fourth quadrants indicates a pro-cyclical fiscal policy: in that case, fiscal policy is restrictive in circumstances when GDP grows below potential, and expansive when GDP growth is above potential.

Fiscal Stance over the Cycle

- A pro-cyclically-oriented fiscal policy does not allow automatic stabilisers to operate by ‘spending when money comes in and cutting when it runs out’.
- As a result, changes in expenditure, for example, follow the changes in GDP growth rather than evolving as planned.
- Therefore, if GDP growth is higher than projected, the cyclical revenue of the budget is used to service the cuts in taxes and the increase in expenditure rather than to reduce the deficit.

Fiscal Stance over the Cycle

- The measurement of the fiscal impulse via changes in the CAB is probably the most controversial application of the indicator: changes in the CAB do not correctly measure either the impact effect or the final effect of fiscal policy on aggregate demand!

Fiscal Stance over the Cycle

- Changes in the CAB would provide only an imperfect view of how fiscal policy affected aggregate demand for a folowing reasons:
  - The CAB does not allow for the fact that changes in taxes will generally have a different impact on demand than changes in spending;
  - indirect (“leakage”) effect are not accounted for;
  - implications of different monetary policy and exchange rate regimes are not considered.

THANK YOU!