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A Non-Taylor Rule Assessment of Eurozone Divergences and Stresses

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SWP-RGE Conference "The Eurozone under Stretch"

June 19, 2007

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Assessing Eurozone Stresses

Unique attention in Eurozone to regional divergences and "appropriateness" of monetary policy to members

Much of the discussion concerns the synchronization of cycles and shocks (convergence, compare to US…)

Optimal currency area inspired approaches, however, underplay the structural differences between member economies and overplay differences in preferences

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How to evaluate monetary policy fit?

- Reaction functions (like Taylor's eponymous rule) have become extremely popular.
  - Very simple (can be written on the back of a business card!), intuitive and transparent
  - A reasonable summary of most central banks' priorities
  - An approximation to optimal instrument rules from certain popular models
- Notable application by CGG to ERM-stresses of '92, followed by Hayo-Hoffmann on Eurozone (to '06)

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How are reaction functions used to assess monetary policy?

- The "calibration" approach:
  - Insert your favorite output gap and inflation measures into a reaction function with "known" parameters (e.g. Taylor's)
  - Evaluate whether the implied path of the instrument interest rate is above or below the observed interest rate
  - For eurozone, this means deciding on member economy specific gaps and parameters (or not)

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How are reaction functions used to assess monetary policy?

- The "estimation" approach:
  - Use your favorite output gap and inflation measures to estimate the parameters of a reaction function for the whole
  - Do the parameter estimates satisfy the "Taylor Principle"? Comparison with other countries' reaction functions?
  - Can also compare implied and actual interest rate paths out-of-sample to look for inconsistency or changes in behavior
  - For the eurozone, that means comparing ECB vs. Buba or Fed behavior, and assuming a uniform set of parameters

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Does this reaction function approach tell us what we want to know about eurozone stresses?

- Not really, for a number of reasons:
  - Focus is only on policy instrument which is a very long way from economic outcomes
    - Monetary policy transmission may vary across economies
    - Effectiveness of policy may vary over time or with shocks
  - Inevitably relies on far from robust estimates of potential output, which may be especially error-prone in eurozone
  - Also critical is the use of a retrospective versus real-time estimate (forward- or backward-looking)

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Does this reaction function approach tell us what we want to know about eurozone stresses?

- Not really, for a number of reasons:
  - Estimated response functions are dominated by interest-rate smoothing terms, with very little variation in other terms
  - Error bands (bootstrapped) on such exercises are so wide as to almost always say rates could be either too high or too low for a given situation, but rarely give clean results

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So here is another way to think about measuring stress…

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Start with a textbook macro model

AS: $\pi = \pi^e + \gamma(y - y^*) + \varepsilon$

AD: $y = y^* - \beta(r - r^*) + \nu$

And minimize central bank loss function:

$$(\pi - \pi^*)^2 + \lambda(y - y^*)^2$$

The resulting "targeting rule" (TR):

$$\pi - \pi^* = -\frac{\lambda}{\gamma}(y - y^*)$$

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Should we worry about λ (conservatism)?

- This is unobservable (except through great effort)
- Yet, most central banks display preferences within a small range (BOJ in 1990s was an exception)
- For the eurozone, this is by assumption true, because:
  - all member countries voluntarily signed up for membership,
  - all member countries have voice at the ECB,
  - and all member countries disinflated to a maximum λ consistent with Buba's (or smaller) upon entry

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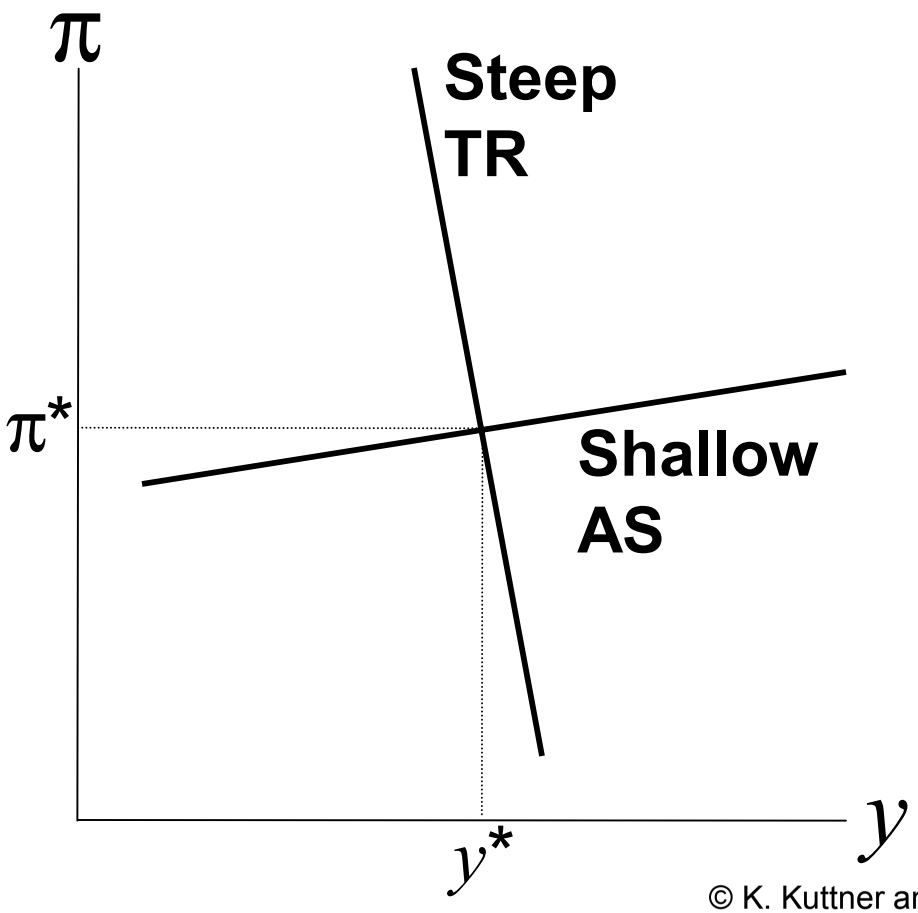
Where do stresses come from then?

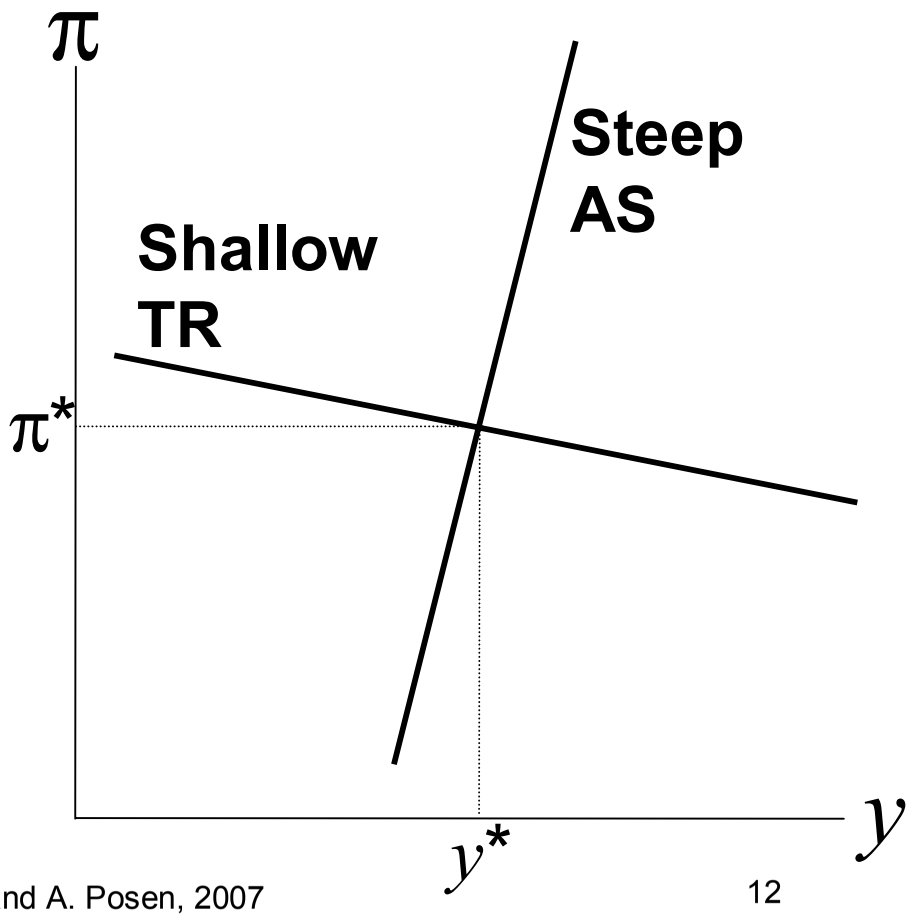
- Country-specific shocks, ε and ν
- Differences in economic structure
  - Specifically: cross-country variation in the slope of the AS curve, γ.
  - Optimal policy response will differ across countries (even with common shocks and λ).
  - Different $\gamma \Rightarrow$ inflation differentials, even when shocks are common to all countries.

In pictures…

Country "A", small γ…

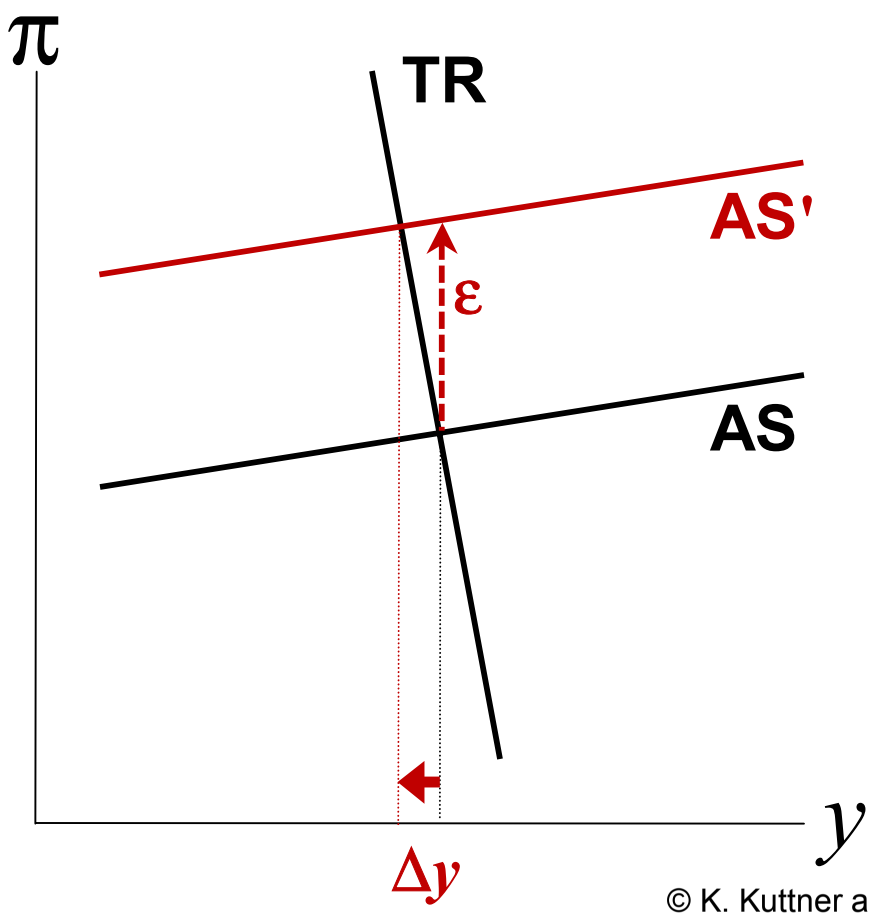


Country "B", big γ…



Assume an inflation shock…

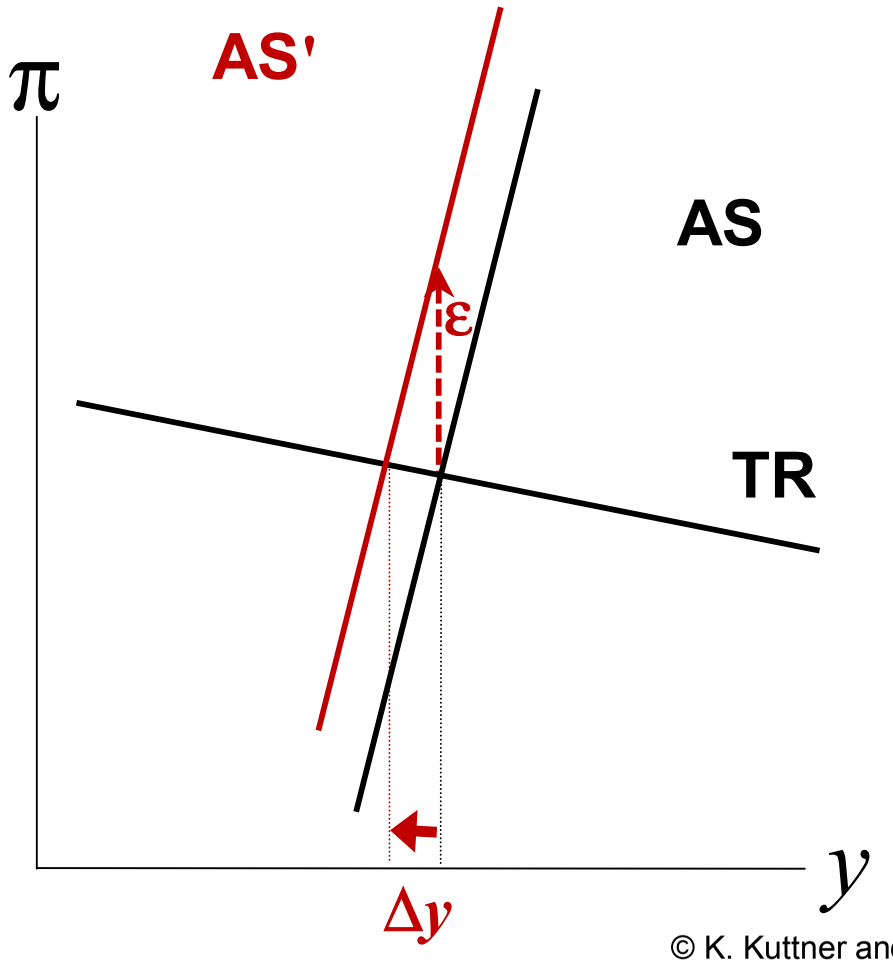
Country "A", small γ…



- Optimal policy ⇒
  - Small y reduction
  - Modest tightening
- Inflation fighting is *costly*, not worth much output sacrifice.
- CB doesn't *want* to tighten much.

Assume an inflation shock…

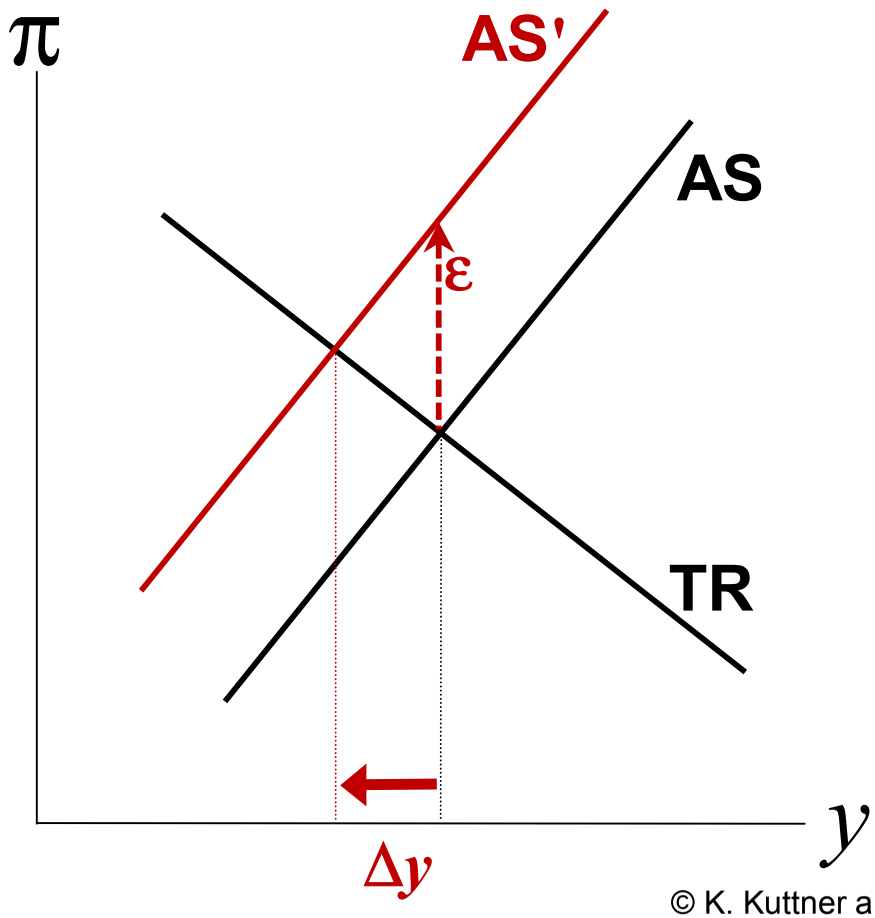
Country "B", big γ…



- Optimal policy $\Rightarrow$
  - Small y reduction
  - Modest tightening
- Inflation fighting is *easy*, does not *require* much output sacrifice.
- CB doesn't *need* to tighten much.

Assume an inflation shock…

Country "C", *moderate* γ…



- Optimal policy $\Rightarrow$
  - Large y reduction
  - Major tightening
- Policy response is largest when inflation fighting is neither too hard nor too easy.

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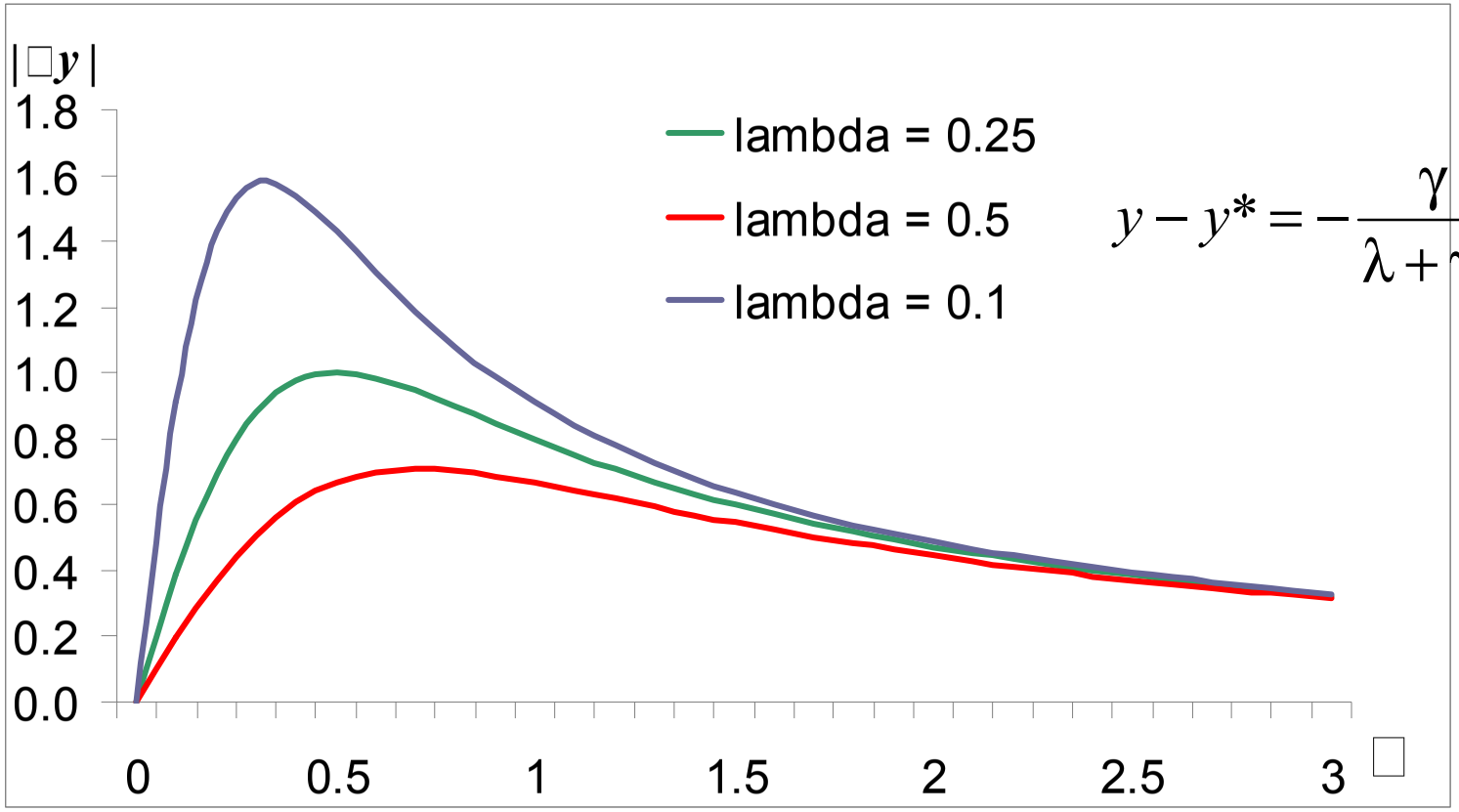
Size of optimal policy response to ε is a non-linear function of γ



More **non-linear for more conservative central banks (smaller λ)**

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One size fits all is too tight for almost everyone…

…so long as structures differ

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Implications for eurostress assessment

- Suppose ECB policy is guided by the euro-wide ***average*** γ (assuming a common λ and optimal policymaking by TR)
- Faced with a common adverse inflation shock, policy will be "too tight" for both high- and low-γ countries
- But by how much?

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Measuring policy stress by country

- Targeting rule ⇒ gap between country-specific optimal output gaps, and the optimal gap based on euro-wide averages.

$$z_i^* - \overline{z}^* = -\lambda^{-1}[(\gamma_i - \overline{\gamma})(\overline{\pi} - \pi^*) + \gamma_i(\pi_i - \overline{\pi})]$$

Differences in γ ⇒ different optimal responses to eurozone inflation.

Inflation dispersion ⇒ different optimal responses, even with no difference in γ.

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Measuring euro aggregate policy stress

- Two simple, descriptive gauges:

$$\frac{1}{12}\sum_{i=1}^{12} \mid z_i^* - \overline{z}^* \mid$$

…average absolute value

$$\sqrt{\frac{1}{12}\sum_{i=1}^{12} (z_i^* - \overline{z}^*)^2}$$

…root mean squared error

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Advantages over the Taylor Rule approach

- Does not presume estimated pre-euro reaction function parameters reflect "optimal" policy.
- Relates "stress" to underlying economic structure, e.g., wage/price flexibility.
  - Makes it possible to think about the implications of *changes* in that structure or convergence across countries
  - Emphasizes differences in structures, not flexibility per se
- No need for output gap estimates.
- Measured stable observable inputs to assessment.

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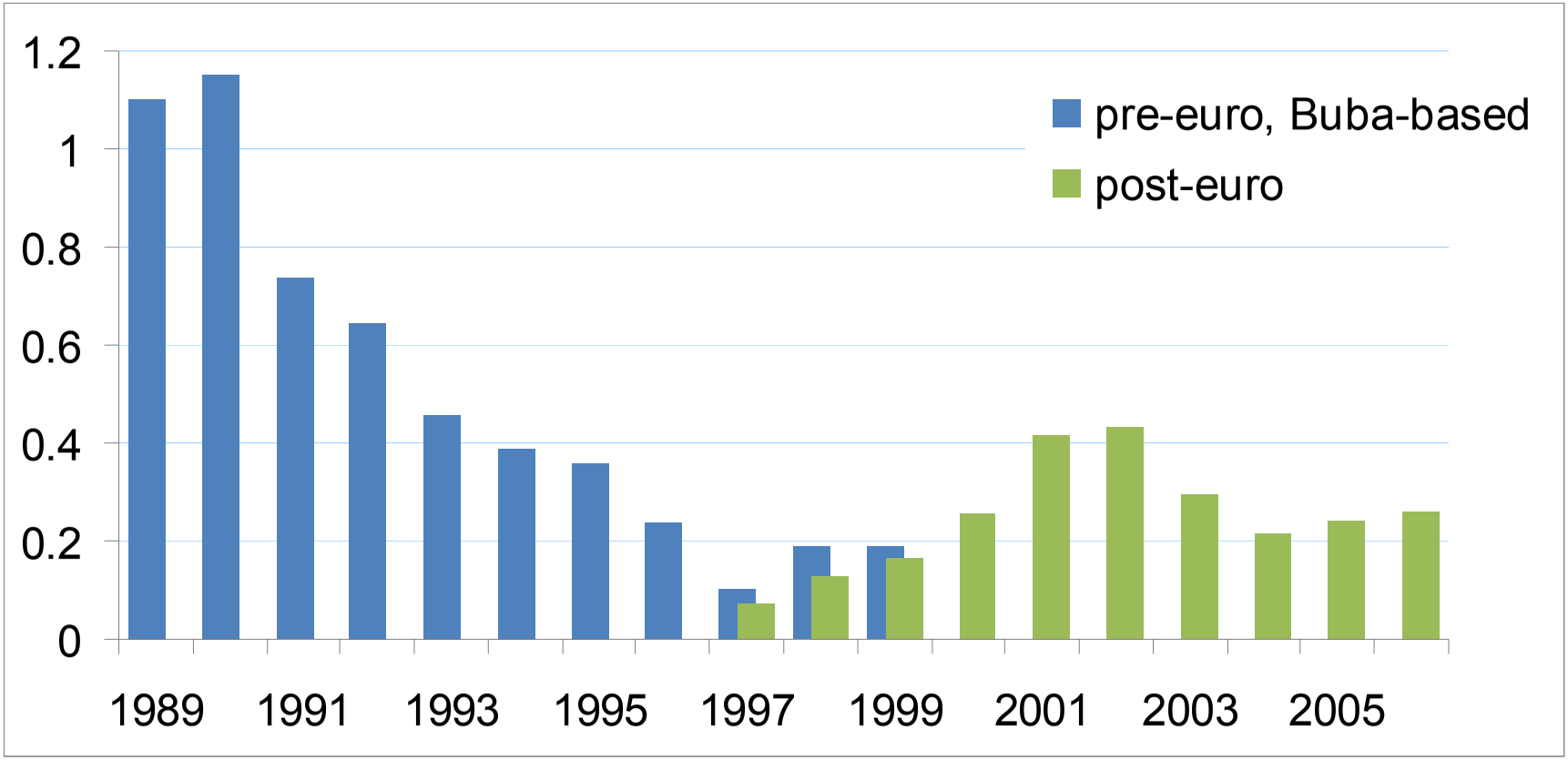
Aggregate ERM- and Eurostress, 1989-2006

based on $\Sigma|stress_i|$



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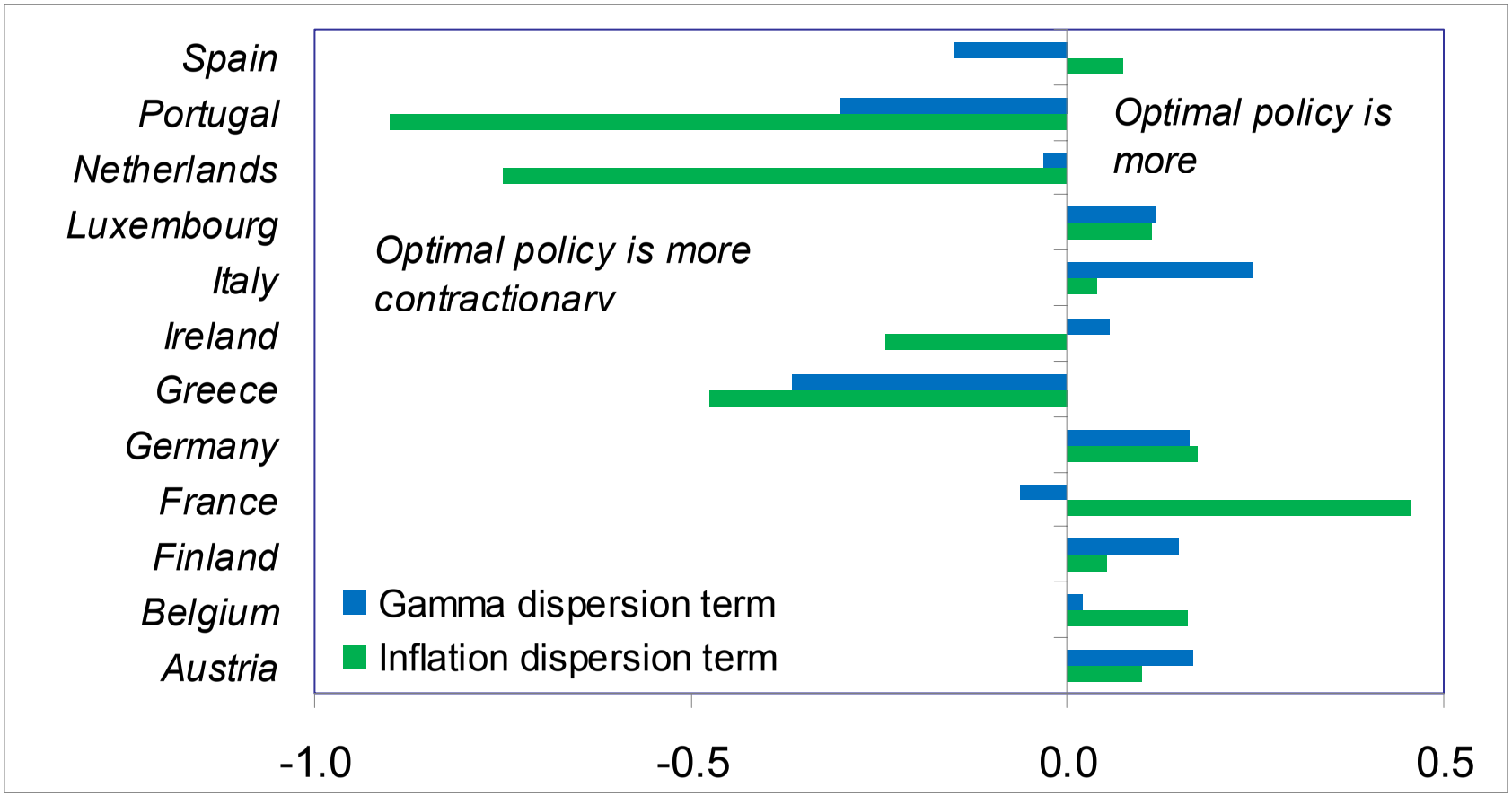
Sources of Eurostress by country, 2001



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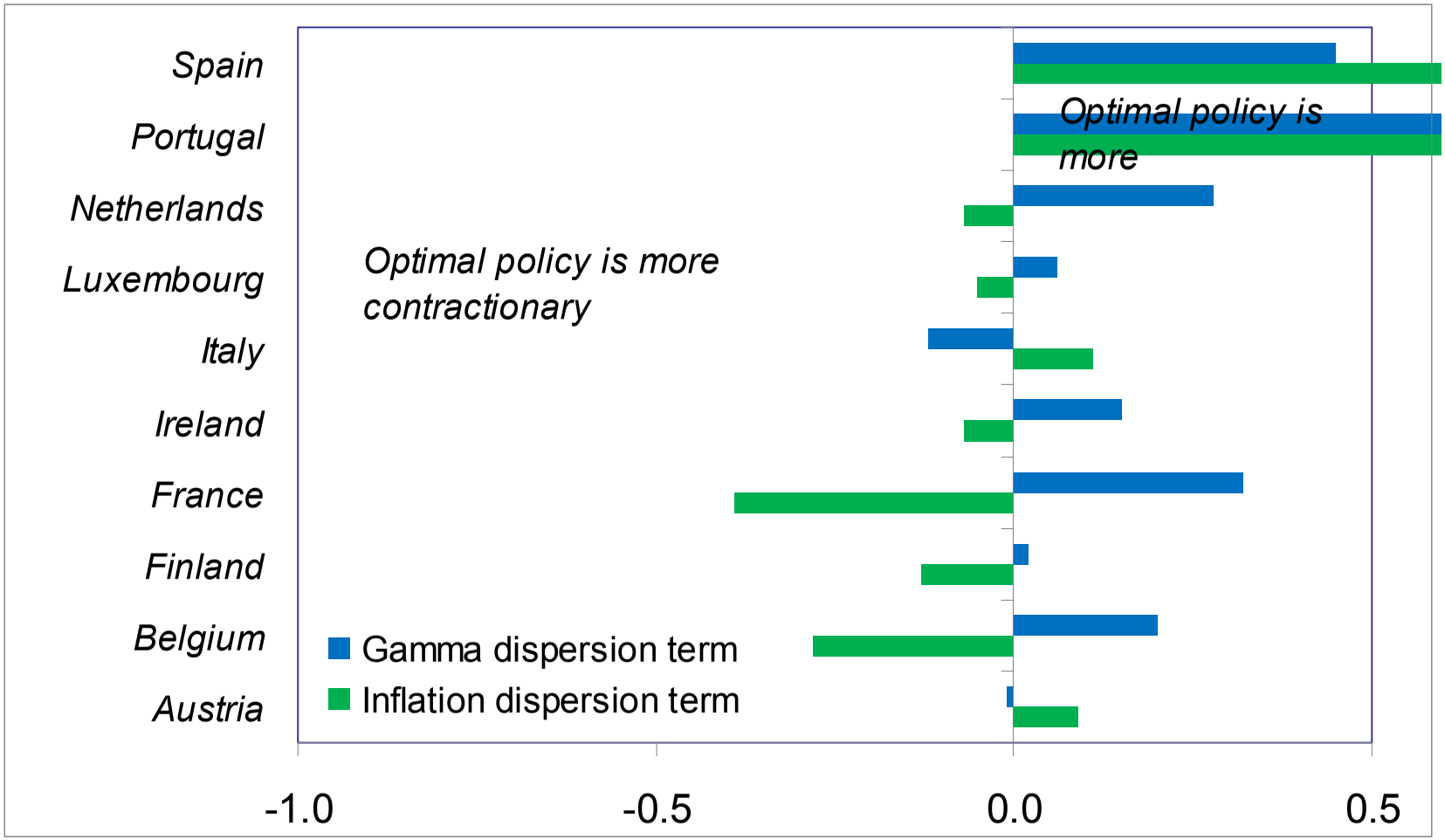
Sources of ERM stress by country, 1992



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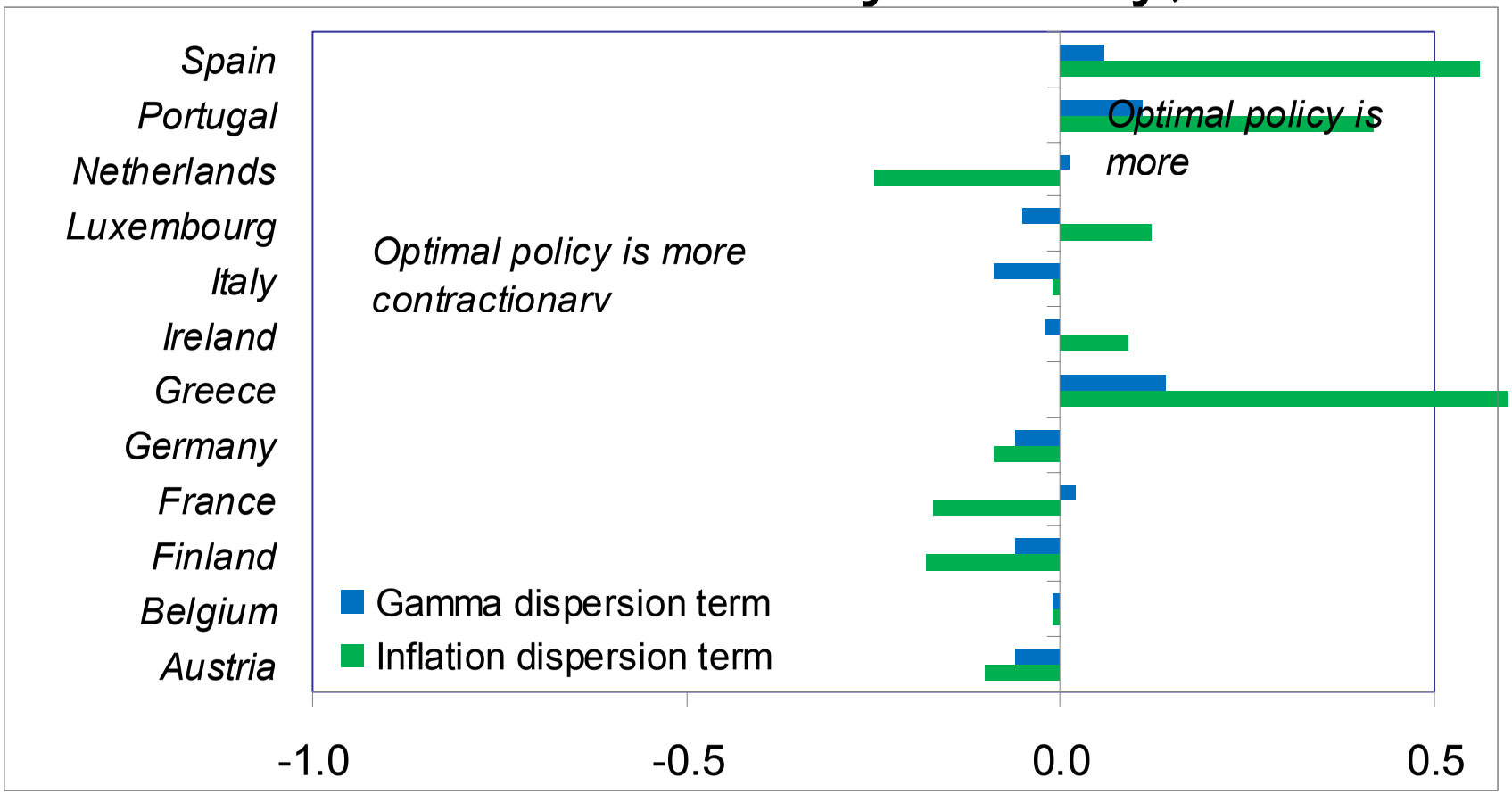
Sources of Eurostress by country, 2006



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An overall assessment of country and total stresses within the Eurozone

- Both differences in inflation rates and in wage/price structures are factors in the total stresses felt
  - Post-1999, however, these tend to be in the same direction
- Aggregate stresses in the eurozone at their worst are well below average stresses within ERM
  - But this begs the question of how to weight the aggregate
- Portugal and Greece suffer the largest ongoing stresses, but sometimes too loose, some too tight
  - Ireland and Italy are surprisingly not under too much stress, but policy has been repeatedly too loose for Netherlands
  - Germany and France don't really have reason to complain