# Inspecting the Mechanism: External Shocks and the ECCU

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# Outline

- Motivation
- Introduction
- Methodology
- Empirical Implementation
- Results
- Scenario Analysis
- Conclusion

# Introduction...

- ECCU highly exposed to external shocks by nature.

- Assessment of the impact of external shocks desirable.

- Provide insight on the adjustment mechanism.

- Beneficial tailwind from global economy 2002 – 2007.

- Central questions:
  - Can growth be achieved in a less benign international environment?
  - What has been the influence of external factors on growth?
  - How has the time path of the ECCU economy been altered?

# Methodology...

- Standard assumption: SOE, foreign developments exogenous.

- Structural model: $G(L)x_t = \mu + \eta_t$

- Reduced form: $A(L)x_t = \delta + v_t$

- Identification: Choleski decomposition and block exogeneity of external variables.

-  "near-VAR" structure: some equations have different RHS variables.

- Can estimate via OLS or SUR.

- Complementary approach: Bayesian VAR.

# Methodology continued...

- Starting point: "Minnesota (or Litterman)" prior.

- Assumptions: Normal distribution, prior distributions centered on zero, except first own lag.

- Assumptions reduce computational and informational burden.

- Result: Prior determined by a few "hyper-parameters".

- Prior determined through:

$$S(i,j,l) = \frac{\{\gamma g(l)f(i,j)\}s_i}{s_j} \qquad\qquad f(i,i) = g(l) = 1.0$$

# Empirics...

- Relevant external factors: foreign demand, oil prices, global financial conditions.

- Domestic block: Real Effective Exchange Rate, Real GDP.

- System constructed as:

- $$x_t = (\Delta y_t^{US} \, i_t^{US} \, \Delta c_t \, \Delta y_t^{ECCU} \, \Delta q_t)$$

- Block exogeneity: shrink prior means on domestic variables in foreign equations towards zero.

- Less restrictive than near-VAR; allows for non-zero posterior if data strongly dis-agrees with the prior.
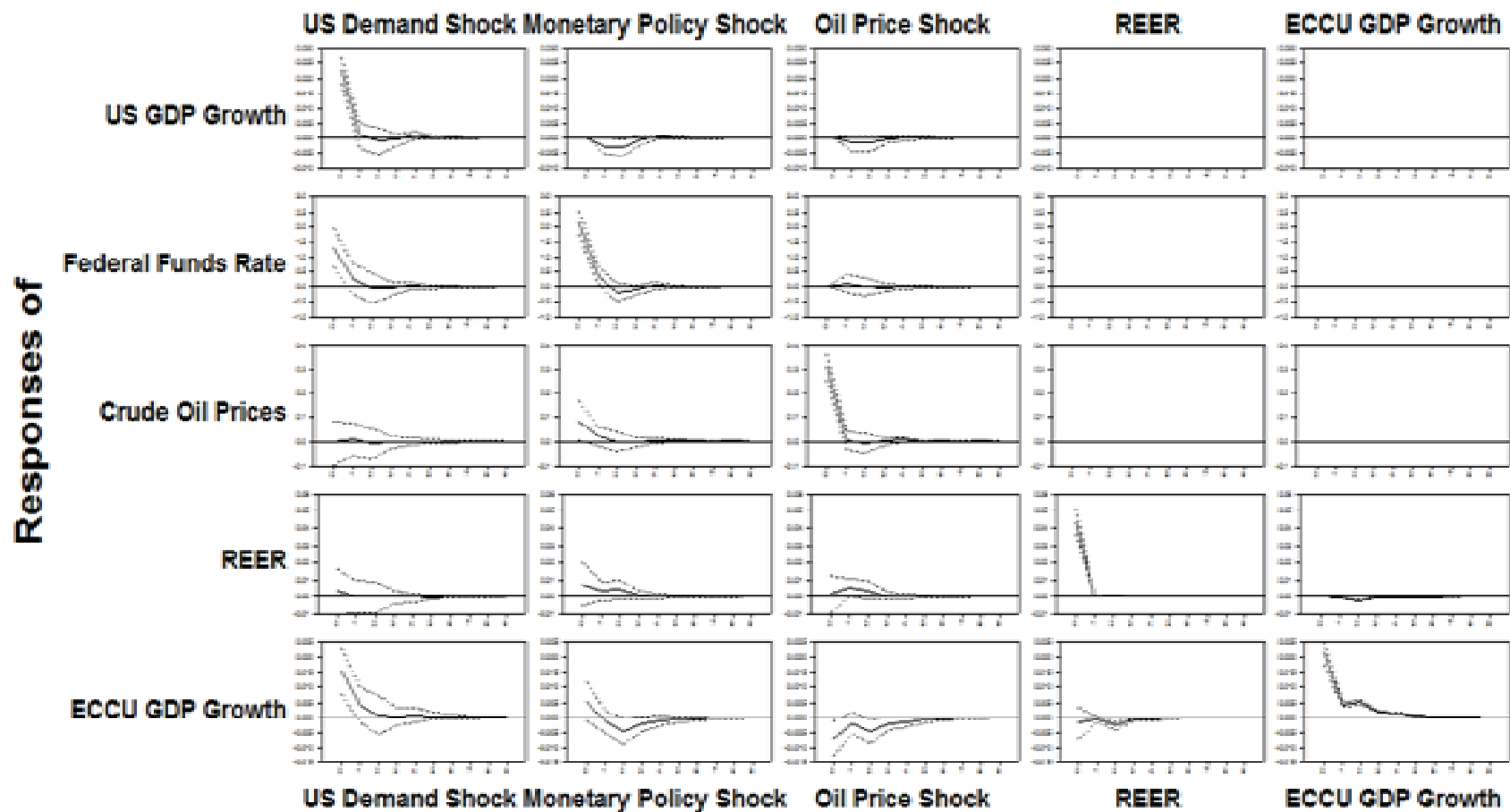
# Results...

## Impulse Response Functions with Respect to One Standard Deviation Shocks
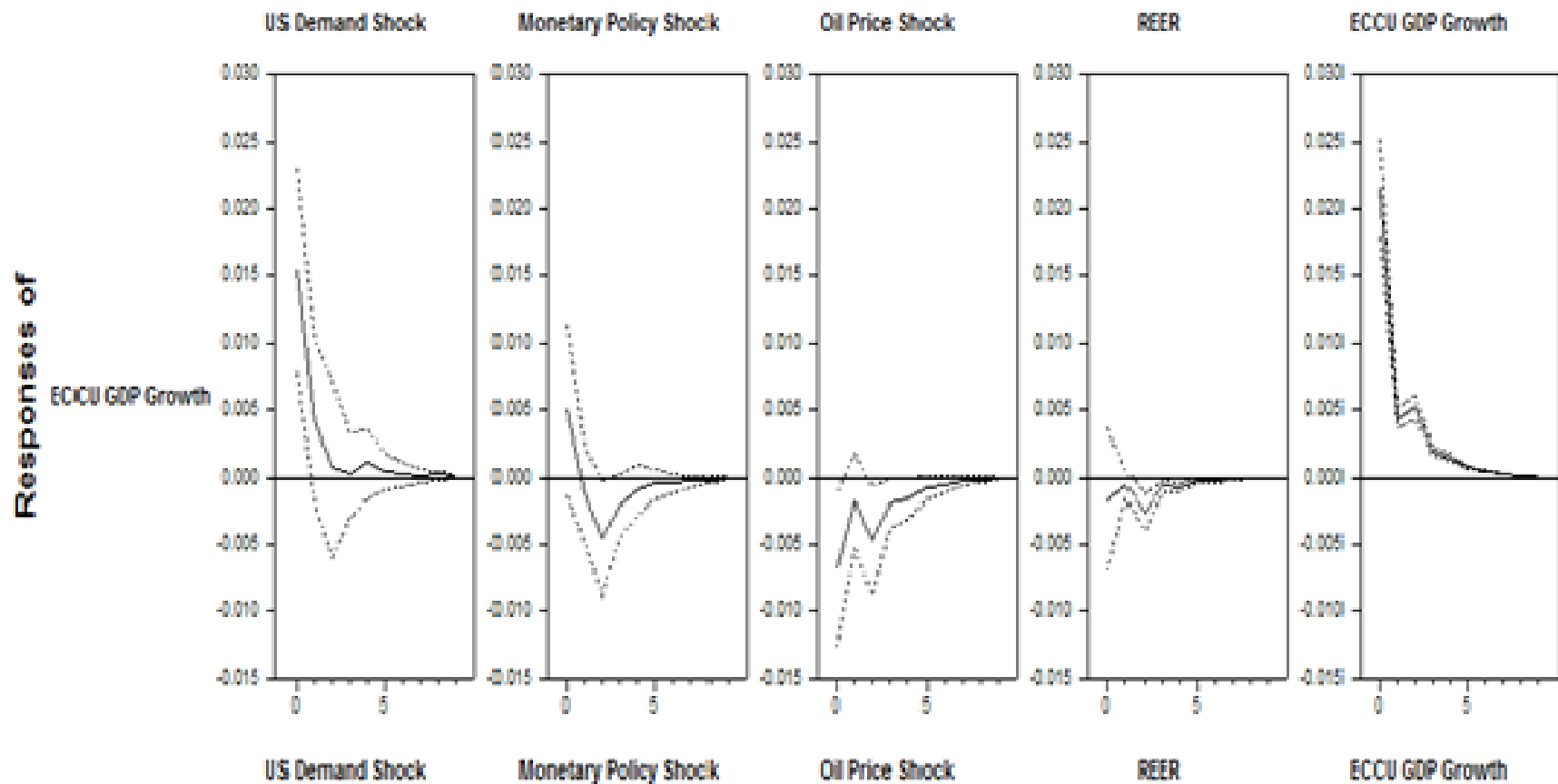
# Results continued...



**Impulse Response Functions with Respect to One Standard Deviation Shocks**

# Results continued…



**Impulse Response Functions with Respect to One Standard Deviation Shocks**

# Results continued....

## Table 1: Variance Decomposition of ECCU Real GDP

| Horizon | US Demand Shock | Oil Price Shock | Monetary Policy Shock |
|---------|-----------------|-----------------|-----------------------|
| 1 | 27.4 | 5.1 | 3.7 |
| 2 | 29.4 | 6.1 | 5.3 |
| 3 | 28.7 | 8.1 | 8.5 |
| 4 | 28.8 | 8.6 | 9.1 |
| 5 | 29.0 | 9.8 | 9.3 |

# Forecast Comparison...

- Bayesian VARs introduced into the literature to improve performance of conventional VARs.

- Assess how model performs relative to two benchmarks: Random Walk, conventional VAR.

- Standard forecast evaluation: RMSE, Theil U.

- Models estimated recursively after hold back period

# Forecast comparison continued…

**Table A2: Forecast Comparison**

|  | Horizon | US Real GDP | Theil U | Federal Funds Rate | Theil U | Oil Prices | Theil U | REER | Theil U | ECCU Real GDP | Theil U |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **VAR** | 1 | 0.77 | 0.80 | 120.40 | 0.67 | 16.59 | 1.19 | 3.86 | 1.81 | 1.68 | 0.98 |
|  | 2 | 0.77 | 0.60 | 133.10 | 0.45 | 25.80 | 1.48 | 2.70 | 0.99 | 2.13 | 0.79 |
|  | 3 | 0.90 | 0.54 | 181.20 | 0.57 | 22.68 | 2.24 | 1.87 | 0.61 | 2.65 | 0.92 |
|  | 4 | 1.84 | 0.82 | 168.40 | 0.71 | 24.52 | 5.60 | 1.50 | 0.44 | 2.10 | 0.96 |
| **BVAR** | 1 | 1.05 | 1.10 | 170.00 | 0.95 | 23.16 | 1.66 | 2.23 | 1.05 | 1.66 | 0.88 |
|  | 2 | 1.27 | 0.98 | 210.40 | 0.71 | 23.72 | 1.36 | 1.36 | 0.50 | 1.93 | 0.72 |
|  | 3 | 1.54 | 0.92 | 207.37 | 0.67 | 19.77 | 1.96 | 1.32 | 0.43 | 2.00 | 0.69 |
|  | 4 | 1.90 | 0.97 | 199.36 | 0.83 | 21.38 | 4.88 | 1.63 | 0.48 | 1.90 | 0.87 |

# Scenario analysis...

- Used to further assess relevance of external variables to ECCU macroeconomic dynamics.

- Conditional forecasts: constraint on future evolution of (certain) endogenous variables.

- Main uses: impose "judgment" on forecasts, what-if scenarios.

- Objective: generate future path of endogenous variables.

- Achieved by using historical data and orthogonal shocks to draw successively from the constrained distribution.
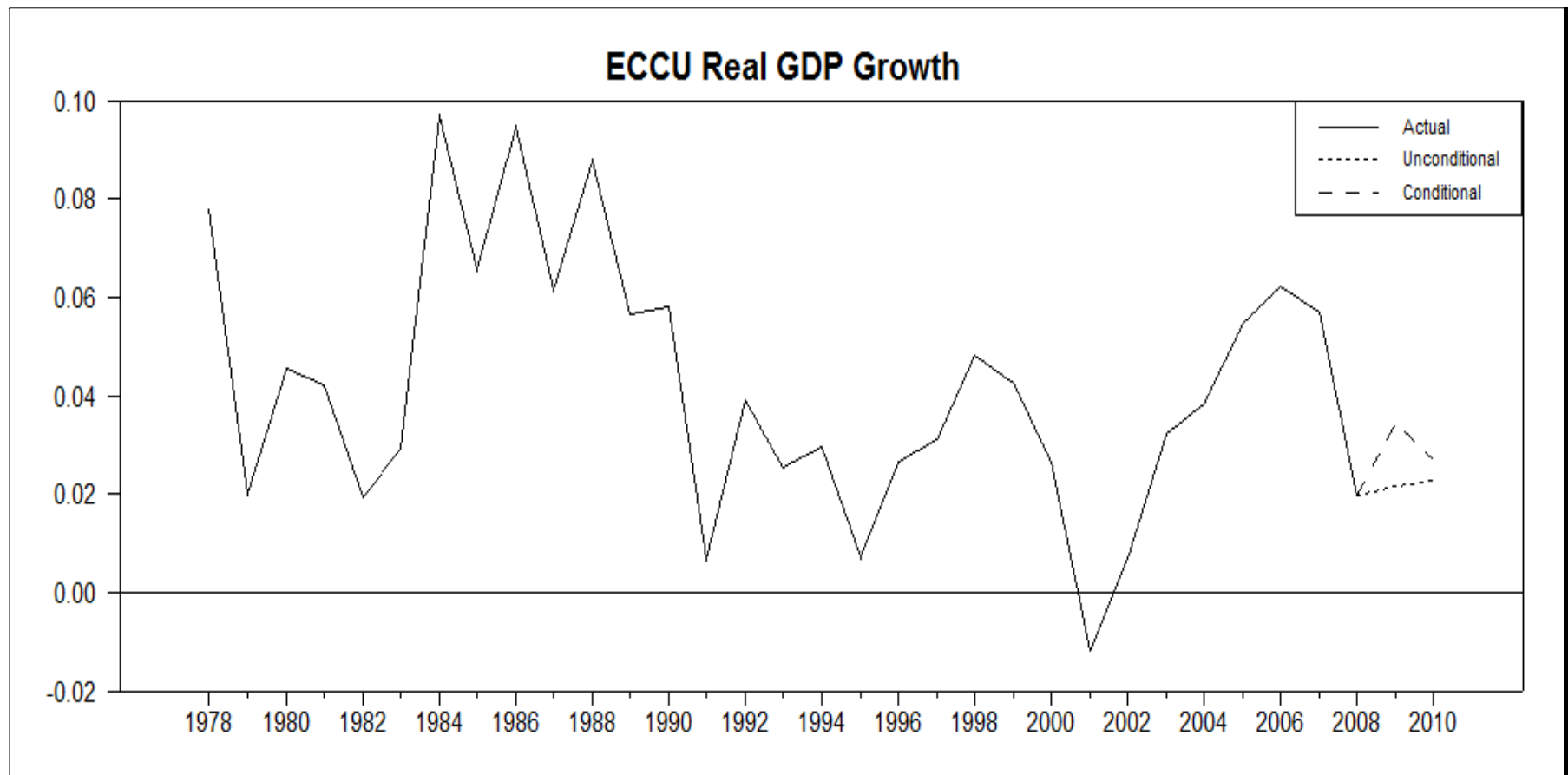
- Shocks generated randomly using Normal distribution.

# Scenario analysis continued...

**<u>Figure 3: Effects of a US Recession on ECCU Growth</u>**
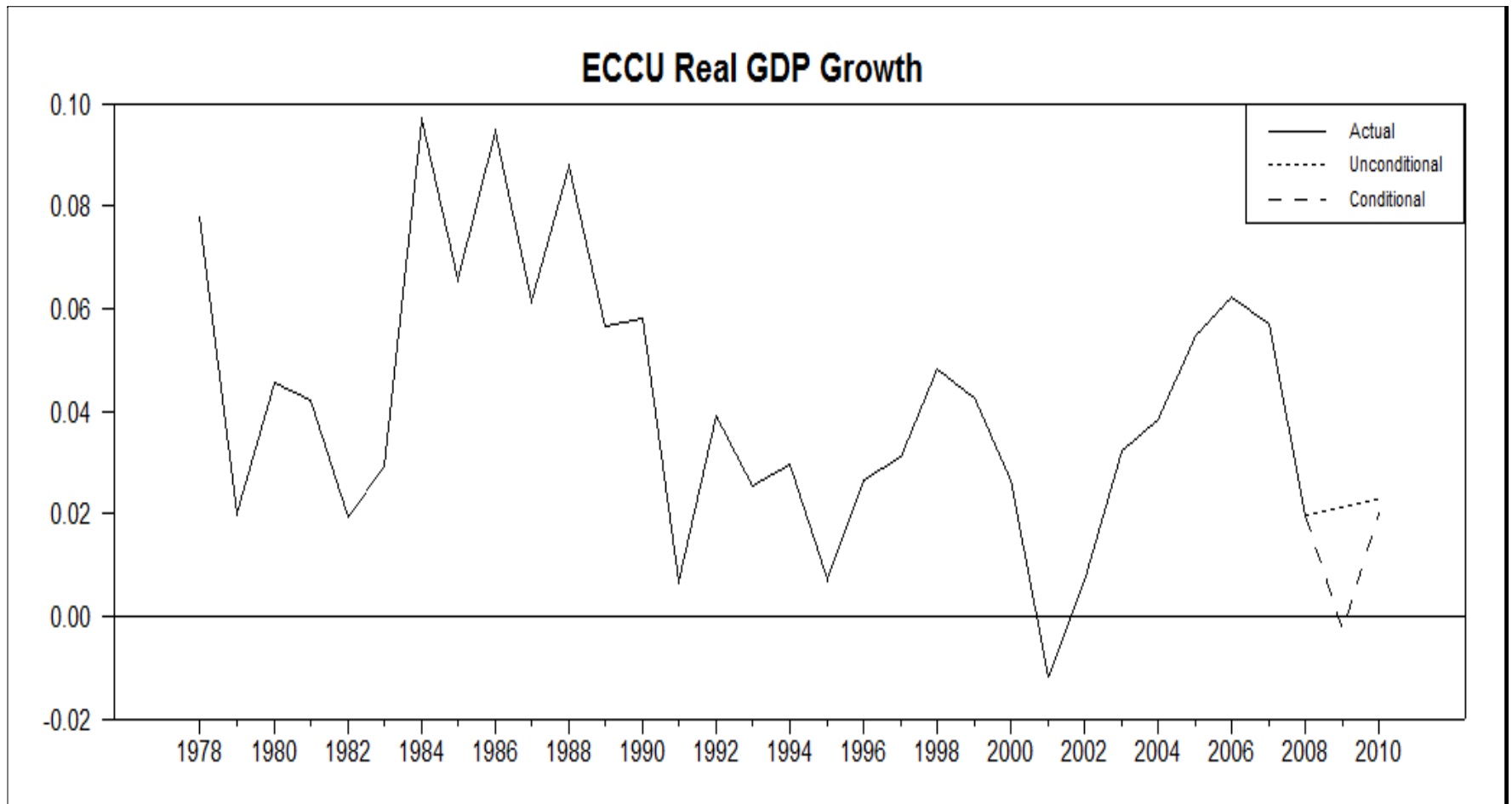
# Scenario Analysis continued...

**Figure 4: Effects of a Reduction in Oil Prices on ECCU growth**

# To wrap up...

- Use of BVAR with block exogeneity restrictions.

- Revised version of Minnesota prior.

- Standard VAR tools – impulse response functions and variance decompositions – highlight vulnerabilities.

- US demand shocks – highly expansionary.

- Financial shocks and oil price shocks contractionary.

- Vulnerability also comes through in scenario analysis.

# Conclusion...

- ECCU will remain highly exposed to external shocks.

- Strengthen policy frameworks: reduce public debt; induce flexibility in fiscal budgets; improve risk-sharing mechanisms; diversify export structure.

- Economic Union can provides scope to pool resources and act as mechanism to transfer resources over varying states of nature.

- Caution: Study very preliminary; small sample size; future work can possibly include other activity variables, a policy variable, and other external variables; country-specific BVARs.

Thank you so much for listening!