How Does Climate Change influence the Design of Monetary Regimes?

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BASED ON

Climate Change

Both the impacts of climate change and the policy responses to climate change are important for monetary policy.
Key points

• Climate shocks have aggregate and sectoral specific quantity and price consequences

• Different climate policies have different effects on inflation and output
  » Price trends
  » price volatility
  » potential output
  » aggregate demand
Climate Basics: Heterogeneous shocks from climatic disruption & ocean acidification

• Cities and facilities in low-lying/vulnerable areas

• Operations vulnerable to droughts or floods

• Disruption of resource inputs, production, markets

• Disruption to labor supply
Climate Policy Shocks

- Expected impacts depend on policy design.
  - Stringency
  - Timing
  - Approach to carbon pricing (cap-and-trade vs. carbon tax vs. Hybrid)
  - Use of revenue

- Outcomes vary by sector, region, fuel
  - Carbon intensity
  - Elasticities
Types of climate policies

- Permit trading system
  - Emissions fixed; Carbon price market determined

- Carbon tax
  - Carbon price fixed; Emissions market determined

- Hybrid of long term emissions trading with short term carbon tax
  - Short term price fixed and long term price market determined

- Regulatory Approaches
An example: a carbon tax
Carbon tax analysis using the G-Cubed Model

Fossil CO2 tax starting at $25/ton, rising at 5% real

Changes in output of each sector in 2035

• 2 assumptions about revenue
  » LS lump sum rebate to households
  » KT reduce tax rate on capital

• BCA (border carbon tax adjustment)
  » No adjustment
  » Adjustment (bca)

Carbon tax analysis using the G-Cubed Model

Fossil CO2 tax starting at $25/ton, rising at 5% real

Changes in output of each sector in 2035

Changes in Real U.S. GDP Relative to Baseline From Fossil CO\textsubscript{2} tax starting at $25/ton, rising at 5% real

GDP effect depends on use of revenue

CO2 tax rate must start higher or grow faster if policy is delayed

Impact of a Carbon tax

- Carbon tax rising in real terms over time
- Trend GDP falls and economic slowdown during implementation
- Inflation rises due to higher energy prices
- Exchange rate depreciates in fossil fuel intensive economies due to a global reallocation of capital
Other Climate Policies are Harder For Central Banks to Accommodate

• **Emissions Trading**
  » Uncertain price signal owing to uncertain cost of abatement (stringency) & variation in economic growth

• **Hybrid Policy**
  » Better than ETS
  » Same predictability in short run as a carbon tax

• **Regulatory/Subsidy/Standards Policy**
  » Most difficult for a given level of environmental performance
  » Effects on output and prices would be opaque and hard to predict
Energy price volatility under different climate policy regimes differ
Futures price of allowances in EU Emissions Trading System
Jan 2005 to October 2017

Source: Bloomberg
Implications for Monetary Policy

• Complex Supply shocks
• Estimation of output gaps more difficult
• climate policies likely to cause
  » Increase volatility in energy prices
  » Trend change in energy prices
• Inflation forecasting likely to be more difficult
Central Bank Response

• Strict inflation target (SIT)
  » Raise interest rates
  » Slow growth
  » Appreciate exchange rate, depress exports
  » Reduce inflation, but worsen output decline

• Flexible inflation target (FIT)
  » Moderate interest rate increase but need to work out shock
  » But must detect carbon tax signal in noise of baseline

• Price level target (PLT)
  » Tighter policy to have deflation so price level returns to base

• In SIT, FIT, and PLT, the central bank would worsen the impact of the shock on economic activity.
Central Bank Response

• Henderson-McKibbin-Taylor Rule (HMT)
  » Balanced reaction to output and inflation effects
  » small change in interest rates
    – Less output decline
    – Higher inflation
  » Forecast of output gap is important

• Nominal Income Targeting (NIT)
  » Balanced reaction to output and inflation effects
  » small change in interest rates
    – Less output decline
    – Higher inflation
  » Only relies on forecast of nominal income
Conclusion

• Central banks should expect more and larger shocks.

• Climate policy design that induces predictable and transparent price signals (like a carbon tax or a Hybrid) makes monetary policy response more transparent.

• Nominal Income Targeting would be better than inflation targeting because
  » it avoids the need for a forecast of potential output
  » does not require understanding precise nature of the climate-related shock
  » It still anchors inflationary expectations to within a band

• A great deal more empirical research is needed