

DANMARKS NATIONALBANK

CLIMATE CHANGE AND DEBT SUSTAINABILITY

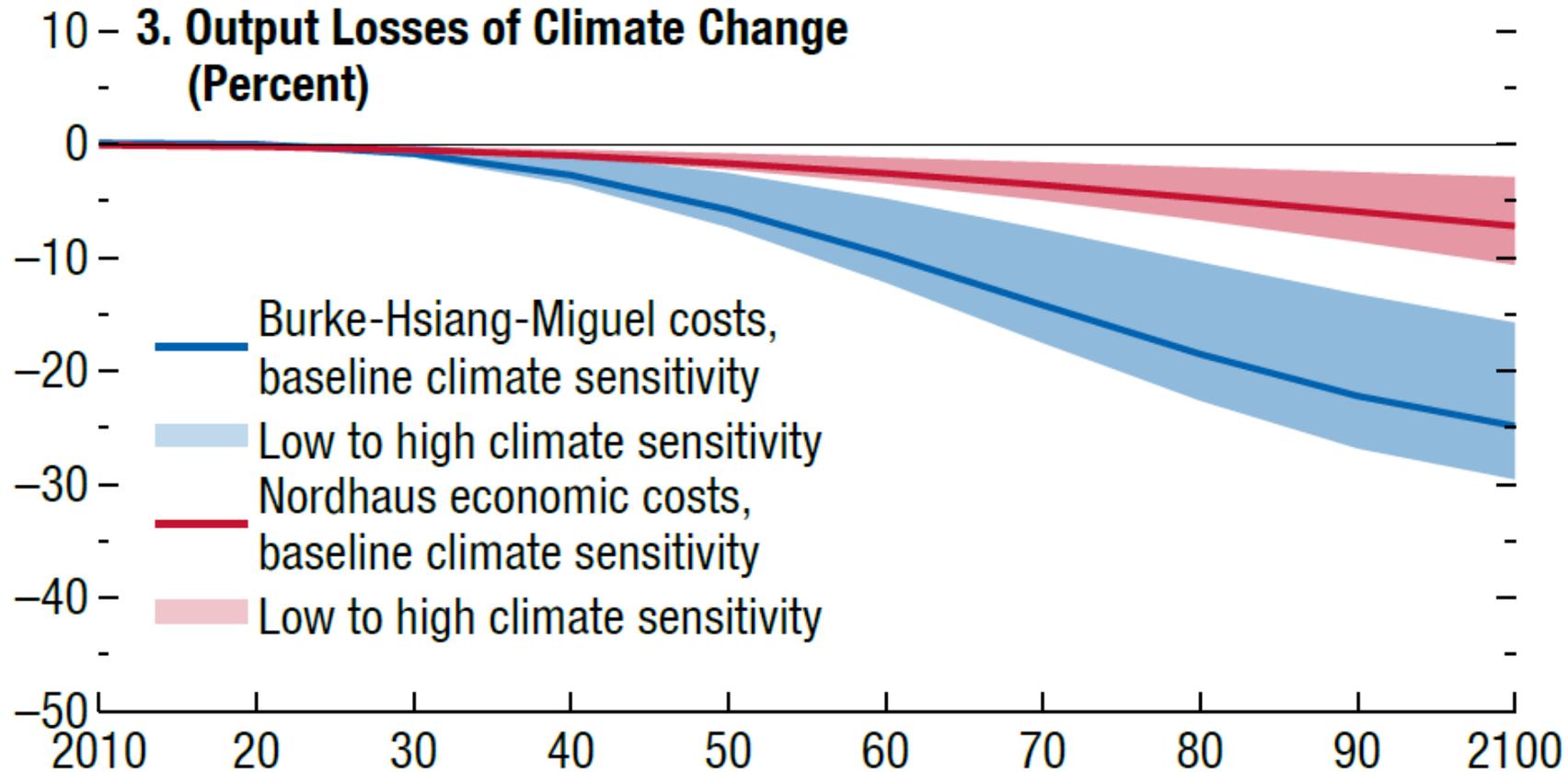
Governor Signe Krogstrup, Danmarks Nationalbank, ESM seminar on debt sustainability, 21 April 2021



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Climate change will have important economic consequences

Output losses of unmitigated climate change



Source: IMF (2020), "World Economic Outlook, October 2020: A Long and Difficult Ascent", chapter 3.

Price, financial and fiscal stability goals are interconnected



Debt sustainability 101

Government debt relative to GDP (d_t) evolves according to

$$d_{t+1} = \frac{1}{1+g_t} [(1 + r_t)d_t - s_t]$$

Government debt relative to GDP is determined by

- Real growth rate of the economy (g_t)
- Real interest rate ($r_t = r_t^* + rp_t$)
- Primary surplus including seigniorage (s_t)

Impact of climate change and the transition

Impact of climate change

Higher temperatures

- Lower productivity in hot climate zones: $g \downarrow$
- Higher productivity in cold climate zones: $g \uparrow$

Natural disasters

- Destruction of productive capital: $g \downarrow$
- More volatile production: $g \downarrow$

Possible financial implications

- Impact on asset prices, credit losses: $rp \uparrow$ and $s \downarrow$
- Investment in resilience and adaptation: $s \downarrow$
- Higher insurance premia: $rp \uparrow$
- Precautionary saving: $r^* \downarrow$

Impact of the transition

Taxes, regulation, changes in technology and consumer preferences

Short- vs. long-term impact differ

- Reallocation from CO₂e-intensive to green sectors : $g?$
- New technology and innovation: $g \uparrow$

Possible financial implications

- CO₂e pricing, subsidies, regulation etc: $s?$
- Impact on asset prices and credit losses: $rp \uparrow$ and $s \downarrow$
- Increased private demand for investment financing: $r^* \uparrow$

Taking stock: It is complicated, it depends...

Government debt relative to GDP (d_t) evolves according to

$$d_{t+1} = \frac{1}{1+g_t} [(1 + r_t)d_t - s_t]$$

	Climate change	Transition to low-carbon economy
Real growth rate of the economy (g_t)	Ambiguous effect, probably negative in most cases	Ambiguous effect, probably negative in many cases
Natural real rate (r_t^*)	Lower rate	Higher rate
Risk premia (rp_t)	Higher premia	Higher premia
Primary surplus (s_t)	Lower surplus	Lower surplus

Challenges and lessons from central bank

Challenges in assessing climate change impact on financial stability

1. Lack of historical data and statistical distributions
2. Low transparency about CO₂e exposures in balance sheets, limited disclosures and standards
3. Sensitivity to assumptions about policy response and political resolve (climate goals vs. current transition plans vs. market expectations?)

Resulting market mispricing of climate risks. Risk of stranded assets

Approach

- Raise attention to climate risks: Awareness, attention in financial markets
- Call for more transparency, data, better standards (e.g., taxonomy, disclosure standards, TCFD)
- Scenario-based analysis for stress testing to complement historical distributions (e.g., NGFS)
- ...?

Key takeaways and issues for discussion

Climate change and the transition have important implications for long-term debt sustainability

Interdependencies between price and financial stability and debt sustainability

- How to account for these?

Adaptation of DSA frameworks to addressing climate risks is complex, many challenges.

- How to incorporate in debt sustainability assessment frameworks? Lessons from central banks

Thank you!

