

Carbon pricing, trade and the natural rate

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How does carbon pricing affect global trade, savings, and interest rates? This study explores the macroeconomic implications of carbon pricing. Using a dynamic three-region model, the authors examine how different carbon pricing policies and revenue recycling schemes influence savings behavior, trade flows, and (implicit) wealth flows across regions. The paper thereby contributes to a better understanding of the economic consequences of carbon pricing, a key policy tool for reducing greenhouse gas emissions. With over 100 countries committing to ambitious climate goals, understanding the broader economic impacts of carbon pricing is critical.

A Three-Region Environmental Life-Cycle Model

The authors employ a dynamic, open economy general equilibrium model with a life-cycle structure, dividing the world into three regions: Europe, North America, and the Rest of the World. The model incorporates environmental features, such as emissions as a by-product of production, abatement costs, and a damage function that links the emissions stock to economic productivity. It also includes demographics, distinguishing between workers and retirees, to capture the effects of carbon pricing on savings and consumption. The model allows for endogenous determination of the natural interest rate and trade flows, providing a comprehensive framework to analyze the interplay between climate policies and macroeconomic variables.

Theoretical Insights and Core Arguments

Carbon pricing increases production costs by making emissions more expensive, leading to higher prices for goods and services. This initial cost push reduces output and investment, but over time lower emissions reduce environmental damage, which improves productivity and generates positive economic spillovers. The extent of these benefits depends on the scale of emissions reduction and the number of regions participating in carbon pricing. However, regions that do not adopt carbon pricing may benefit from trade spillovers, as their goods become relatively cheaper, leading to carbon leakage. Border adjustment mechanisms, which tax imports based on their carbon content and subsidize exports, mitigate this leakage, but only slightly.

Key Findings: The Role of Revenue Recycling

The study highlights that the effects of carbon pricing on aggregate savings, trade and asset flows and, thereby, the natural interest rate depend significantly on how governments recycle carbon revenues:

Lump-Sum Redistribution to All Households: When carbon revenues are distributed uniformly to all households, retirees experience an increase in income, which reduces their incentive to save. As they eventually retire, workers likewise reduce their saving. This leads to a decline in aggregate savings and a permanent rise in the natural interest rate.

Targeted Redistribution to Workers: If revenues are used to reduce labor taxes or directly benefit the working population, workers' net income increases, encouraging both consumption and saving. Retirees, in contrast, face higher consumption costs without a corresponding income boost, leading to reduced consumption. In this scenario, aggregate domestic savings rise in the carbon price-

introducing region. Although world savings may still decrease, this mitigation of the savings slump plus reshuffling of investment opportunities contributes to the natural interest rate declining in the medium to long term.

Trade and Net Foreign Assets: Regions introducing carbon pricing experience a relative increase in production costs, making their goods more expensive internationally. This reduces exports and increases imports, affecting trade balances and net foreign asset positions. The impact is more pronounced in regions with higher emissions intensity.

Conclusions

The findings underscore the importance of revenue recycling in shaping the macroeconomic outcomes of carbon pricing. Policymakers must carefully design redistribution schemes to balance the trade-offs between consumption, savings, and investment. Careful policy design and global collaboration to ensure sustainable and equitable outcomes would appear necessary. While the model provides valuable insights, we acknowledge limitations, such as uncertainties in estimating the economic damage of emissions and the potential for technological progress. Future research could explore these aspects to refine the understanding of optimal climate policies.

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