Research statement

Diego R. Känzig, Northwestern University, November 2025*

I am a macroeconomist specializing in the economics of climate change and inequality. In my work, I seek to advance two core research agendas. The first concerns the role of *energy and climate change* for growth and economic fluctuations. The second is to understand how *economic inequality and household finance* shape the transmission of macroeconomic policy. My research highlights that climate change and inequality have important macroeconomic implications, both in the short and in the long run.

My research approach puts a strong emphasis on *identification*. I like getting creative in finding new instruments to identify the causal effects of interest—exploiting new sources of information such as high-frequency, micro or narrative data—and looking at micro *and* macro moments to discriminate between competing theories. On the theoretical side, I complement tractable models to better understand the underlying mechanisms with more quantitative versions to conduct counterfactual analyses.

Climate change: Physical and transition risks. My first line of work studies the macroeconomic consequences of physical climate risks, with the goal of rethinking how we measure and quantify climate damages. A key object in this context is the damage function—how changes in temperature affect economic output. The existing literature typically focuses on local, country-level variation, which allows for credible identification by controlling for confounders through fixed effects. However, this approach also nets out much of the relevant global variation.

In "The Macroeconomic Impact of Climate Change: Global vs. Local Temperature" [9] (with Adrien Bilal, R&R at the *Quarterly Journal of Economics*), we revisit the impact of climate change on the macroeconomy. Contrary to previous work, we exploit time-series variation in global mean temperature—rather than local, country-level changes—driven by natural climate variability such as El Niño or solar cycles. Based on this approach, we find that a permanent 1°C rise in global temperature reduces world GDP by more than 20% in the long run—an order of magnitude larger than previous estimates based on local temperature.

The key insight is that global temperature captures the broader climatic effects associated with warming—particularly the rise in extreme events such as droughts, floods, and storms—that local temperature measures miss. Our results show that global temperature shocks cause persistent declines in capital, investment, and productivity, with stronger effects in warm and low-income countries. A simple growth model consistent with these dynamics implies welfare losses exceeding 30% and a Social Cost of Carbon

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above $1,000 per ton.

Building on these insights, I am extending this research to move beyond productivity-based damages by quantifying how global temperature shocks affect demand, mortality, and financial stability, thereby providing a more comprehensive assessment of the macroeconomic and welfare consequences of climate change.

One project along these lines, "Prices and Quantities in a Warming World" [18] (with Adrien Bilal), studies how climate change affects both prices and quantities in the macroeconomy. By jointly analyzing the responses of output and inflation to global temperature shocks—while conditioning on the monetary policy response—we can disentangle whether climate change primarily acts through supply disruptions or through shifts in aggregate demand. The relative strength of these channels has important welfare implications, but depends on the degree of inequality and financial frictions in the economy, which govern the strength of demand propagation.

A second project, "Climate Change and Mortality" [19] (with Adrien Bilal and Krzysztof Lisiecki), provides global estimates of how climate change affects mortality. We construct a new dataset covering most of the world's population since 1960—including previously missing data for China and India—and estimate the dynamic effects of global temperature shocks using local projections. We find that global temperature increases cause large and persistent rises in mortality, particularly in warm and low-income countries. The estimated effects are an order of magnitude larger than those implied by local heat, consistent with global warming amplifying multiple hazards such as droughts, floods, and storms simultaneously.

A third project, "Climate Risks and Financial Stability: 1850–2024" [16] (with Adrien Bilal, Emirhan Ilhan, Karsten Müller and Chenzi Xu), examines how climate shocks affect the stability of financial systems using a new historical dataset covering 180 countries over more than a century. We find that increases in global temperature are systematically associated with a higher likelihood of sovereign debt and banking crises. These results suggest that climate change not only erodes productivity, but also poses systemic risks to fiscal and financial stability—especially in emerging economies that are more exposed to physical climate hazards and fiscal constraints.

Finally, in "The Macroeconomic Effects of Supply Chain Shocks" [13] (with Ramya Raghavan), we investigate how exogenous disruptions to key maritime choke points such as the Suez and Panama Canals propagate through global production networks. We find that these shocks lead to persistent increases in shipping costs, declines in output, and higher inflation—highlighting the vulnerability of global supply chains to physical and climatic disruptions.

Overall, these projects aim to provide a more comprehensive assessment of the effects of climate change, including real, financial and demographic impacts.

The second line of my research studies transition risks—the macroeconomic consequences of energy price changes and climate policies aimed at decarbonization. In my paper "The Unequal Economic Consequences of Carbon Pricing" [3] (conditionally accepted at the *American Economic Review*), I develop a novel identification strategy to estimate the aggregate and distributional effects of carbon pricing. Exploiting institutional features of the European carbon market and high-frequency data around policy announcements, I isolate unexpected regulatory shocks to carbon prices and trace their effects on emissions, output, inflation, and inequality. I find that tighter carbon policies raise energy prices, reduce emissions, and spur green innovation, but also depress economic activity and disproportionately burden lower-income households. These distributional effects arise not only because poorer households spend more on energy, but also because they experience larger income losses through employment and wage channels. I expand on the household-level welfare impacts in a companion paper [1] (with Saki Bigio, Pablo Sanchez and Conor Walsh, conditionally accepted at the *Economic Journal*).

Quantitatively, I use the estimated responses to infer an aggregate marginal abatement cost of slightly above €100 per ton of CO2—suggesting that market prices may understate the true economy-wide costs of decarbonization. The findings highlight a key policy trade-off: while carbon pricing is effective in reducing emissions, accompanying fiscal measures may be needed to mitigate short-run costs and maintain public support for climate policy.

In related work, my paper "The Macroeconomic Effects of Oil Supply News" [8] (published in the *American Economic Review*) analyzes how shocks to oil supply expectations affect the oil price and the broader economy. Using high-frequency data around OPEC announcements, I identify shocks to expected future oil supply and show that negative supply news leads to an immediate rise in oil prices, higher inflation, and lower output—providing direct evidence of a powerful expectations channel in the oil market. This research demonstrates how shifts in energy price expectations, even without changes in actual supply, can have strong stagflationary effects and shape monetary and fiscal policy trade-offs.

In a series of papers, I further study the transmission mechanisms of climate policy. A first project, "The Macroeconomic Effects of Climate Policy Uncertainty" [11] (with Konstantinos Gavriilidis, Ramya Raghavan and Jim Stock), develops a novel newspaper-based index to measure uncertainty about the future path of climate policy and proposes a new narrative instrument to identify exogenous policy uncertainty shocks. We find that higher climate policy uncertainty reduces output and investment while increasing inflation—suggesting that such shocks act as supply rather than demand shocks. These shocks depress activity through lower firm investment and R&D,

particularly among firms with high climate exposure, and generate inflationary pressures that pose a trade-off for monetary policy. The results imply that a clear and predictable climate policy path is crucial to minimize transition costs.

In another paper, "Carbon Leakage to Developing Countries" [14] (with Julian Marenz and Marcel Olbert), we examine how climate policies in advanced economies spill over to the developing world through multinational production networks. Using novel data combining firm ownership links and spatial emissions in Africa, we show that as European multinationals face higher carbon prices, their subsidiaries in Africa expand production and emissions. At the aggregate level, we document significant increases in economic activity and emissions in low-income countries exposed to European climate policy, highlighting that the global transition to net zero involves complex trade-offs between environmental effectiveness, equity, and development.

In "Green Business Cycles" [12] (with Maximilian Konradt, Lixing Wang and Donghai Zhang), we study how climate and energy policies affect the dynamics of green innovation. Using comprehensive patent data, we find that while non-green innovation is procyclical, green innovation is countercyclical: firms increase green patenting during downturns and after contractionary policy shocks. We develop a business-cycle model with endogenous green and non-green innovation to rationalize these findings. The model implies that carbon pricing and other climate policies, while costly in the short run, can accelerate the green transition by strengthening incentives for clean innovation.

In "Climate Policy and the Economy: Evidence from Europe's Carbon Pricing Initiatives" [4] (with Maximilian Konradt, *IMF Economic Review*), we compare the macroeconomic and environmental impacts of national carbon taxes and the EU Emissions Trading System (ETS) within a unified empirical framework. Both policies reduce emissions, but the EU ETS entails larger short-run economic costs due to stronger price pass-through in the energy sector, limited revenue recycling, and a tighter monetary policy response. These results highlight how sectoral coverage, fiscal design, and monetary interactions shape the aggregate effects of carbon pricing.

Finally, in "Unraveling the Drivers of Energy-Saving Technical Change" [15] (with Charles Williamson), we study the forces that decouple economic growth from energy consumption. We construct new quarterly measures of energy-saving technological progress for the U.S. and show that only energy-saving technology shocks—not energy price shocks or generic productivity shocks—can explain the observed long-run divergence between output and energy use. While higher energy prices spur energy-saving innovation and are key to achieving reductions in energy use, they are also recessionary. These results suggest that an effective transition requires a combination of policies: carbon pricing to incentivize substitution away from fossil energy, and in-

novation policies to accelerate technological progress in clean and efficient energy use.

Bringing together the insights from my work on physical and transition risks, "Does Unilateral Decarbonization Pay for Itself?" [2] (with Adrien Bilal, *AEA Papers & Proceedings*) combines the new global damage estimates from our analysis of physical climate risks with marginal abatement cost estimates. We show that when accounting for global temperature damages, unilateral decarbonization becomes economically justified for large economies such as the United States and the European Union: domestic benefits from avoided climate damages exceed abatement costs for over 80% of economic activity. This result stands in sharp contrast to conventional estimates based on local temperature variation, which suggest that unilateral action is not cost-effective.

In a new project, "Optimal Warming" [17] (with Adrien Bilal and Thibault Ingrand), we develop a novel integrated assessment framework to study the joint dynamics of economic growth, carbon emissions, and temperature in the long run. Building on our empirically estimated damage functions, we characterize balanced growth in both the decentralized economy and the social planner solution—something not done in previous work, which typically relies on backstop technologies or assumes energy prices diverge to infinity in the long run. The analysis reveals two possible long-run regimes. In the laissez-faire equilibrium, when technological progress outpaces decarbonization, temperature rises without bound and drags down long-run growth through climate damages. By contrast, the social planner internalizes the externality, stabilizes temperature, and sustains positive long-run growth. The framework provides a new lens to understand how the growth-climate interaction shapes optimal policy and the long-run trajectory of the global economy. We are currently extending the model to allow for endogenous technological change and population dynamics, enabling a full quantitative evaluation of optimal carbon pricing and long-run global warming.

Together, these projects aim to quantify the economic trade-offs of the climate transition and provide a unified macroeconomic framework linking climate damages and decarbonization costs. By combining causal evidence on the impacts of climate change and mitigation policies with new structural models of the global economy, this research seeks to inform the optimal design of climate policies.

Inequality as a propagation mechanism. Another line of my research focuses on the role of heterogeneity in the transmission of macroeconomic shocks and policies. In "Capital and income inequality: an aggregate-demand complementarity" [5] (with Florin Bilbiie and Paolo Surico, *Journal of Monetary Economics*), we study the role of household heterogeneity in the transmission of aggregate-demand policies and monetary policy in particular. We show that income inequality together with heterogeneity in savings generates a strong complementarity: the impact of aggregate-demand

shocks on consumption when both heterogeneity dimensions are active is an order of magnitude larger than the mere addition of the effects of each heterogeneity in isolation. We characterize this finding analytically, in a simple saver-spender model, and quantitatively, in a New Keynesian framework featuring capital investment, idiosyncratic risk and heterogeneity in household saving and income. A robust prediction of our model is that consumption inequality is more countercyclical than income inequality, in line with the empirical evidence.

In a follow-up paper "Greed? Profits, Inflation, and Aggregate Demand" [10] (with Florin Bilbiie, R&R at *American Economic Journal: Macroeconomics*), we extend this line of work to study the role of inequality and income distribution in shaping inflation dynamics. Motivated by the recent policy debate around "greedflation", we ask whether rising profits can themselves drive inflation in the New Keynesian framework. We show that in standard monetary models, procyclical profits tend to dampen rather than amplify inflation. We derive analytical conditions under which profits, inflation, and demand comove positively—reconciling the data with model predictions—and show that heterogeneity in profit income can magnify or mitigate these effects depending on the distribution of profits.

In an ongoing project "The Causal Effects of Transfers" [20] (with Jonathon Hazell and Ed Manuel), we study one of the core questions in macroeconomics: how government transfers affect aggregate demand. While there is a vast micro literature estimating marginal propensities to consume (MPCs) at the household level, much less is known about how these micro responses translate into macroeconomic effects. Using a new narrative account of Social Security and veterans' payments in the postwar United States, we classify policy changes into endogenous and plausibly exogenous components to identify transfer shocks in the time series. We find that while short-run transfer multipliers are below one, the longer-run multipliers are substantially larger than one, as transitory transfer shocks lead to persistent increases in aggregate consumption. These results suggest that transfers can have long-lasting expansionary effects, consistent with models emphasizing intertemporal MPCs and dynamic consumption responses. By directly estimating transfer multipliers, our project bridges the gap between micro evidence and macroeconomic outcomes, providing new insights into how fiscal redistribution impacts the economy.

Identification in macroeconomics. A unifying theme across much of my research is the effort to overcome what I view as a central challenge in macroeconomics: the *missing intercept problem*. While a growing micro literature credibly estimates local effects—such as household-level MPCs or firm-level responses—translating these micro impacts into aggregate macroeconomic responses typically requires strong struc-

tural assumptions. Instead, my work seeks to bridge this gap by directly estimating aggregate elasticities and causal effects using recent advances in time-series identification, often grounded in high-frequency, narrative, or historical sources.

In ongoing work "The Macroeconomic Effects of Tariffs: Evidence from U.S. Historical Data" [21] (with Tamar den Besten), we apply a narrative approach to identify exogenous tariff changes in the United States from 1850 to the present. While much of the existing empirical work focuses on postwar data and short-run, partial-equilibrium outcomes, our long historical perspective allows us to analyze the macroeconomic consequences of large-scale tariff changes. Preliminary results suggest that tariff increases are followed by persistent declines in output and trade but interestingly the effects on inflation remain muted. We are extending this analysis to quarterly data and richer historical sources to isolate key episodes and better quantify the aggregate effects of protectionist policy. This project exemplifies my broader research agenda of bringing careful identification to macroeconomic questions of first-order policy relevance.

Finally, some of my work extends beyond my core research agendas. In "The Distributional Impact of the Pandemic" [7] (with Sinem Hacioglu and Paolo Surico, *European Economic Review*), we document how COVID-19 widened income and consumption inequality. In "International Inflation Spillovers: The Role of Different Shocks" [6] (with Gregor Bäurle and Matthias Gubler, *International Journal of Central Banking*), we show that cross-country inflation transmission depends crucially on the nature of underlying shocks.

Published papers (includes forthcoming)

1. Saki Bigio, Diego R. Känzig, Pablo Sanchez, and Conor Walsh. "Carbon Pricing and Inequality: A Normative Perspective". *Conditionally accepted, The Economic Journal* (2025).
2. Adrien Bilal and Diego R. Känzig. "Does Unilateral Decarbonization Pay for Itself?" *American Economic Association Papers and Proceedings* 115 (2025), pp. 369–373.
3. Diego R. Känzig. "The Unequal Economic Consequences of Carbon Pricing". *Conditionally accepted, American Economic Review* (2025).
4. Diego R. Känzig and Maximilian Konradt. "Climate Policy and the Economy: Evidence from Europe's Carbon Pricing Initiatives". *IMF Economic Review* 72 (2024), pp. 1081–1124.
5. Florin O. Bilbiie, Diego R. Känzig, and Paolo Surico. "Capital and income inequality: An aggregate-demand complementarity". *Journal of Monetary Economics* 126 (2022), pp. 154–169.
6. Gregor Bäurle, Matthias Gubler, and Diego R. Känzig. "International inflation spillovers: The role of different shocks". *International Journal of Central Banking* 17.1 (2021), pp. 191–230.
7. Sinem Hacıoğlu-Hoke, Diego R. Känzig, and Paolo Surico. "The distributional impact of the pandemic". *European Economic Review* 134 (2021), p. 103680.
8. Diego R. Känzig. "The Macroeconomic Effects of Oil Supply News: Evidence from OPEC Announcements". *American Economic Review* 111.4 (2021), pp. 1092–1125.

Under revision

9. Adrien Bilal and Diego R. Känzig. "The macroeconomic impact of climate change: Global vs. local temperature". *Revise and resubmit, Quarterly Journal of Economics* (2025).
10. Florin O. Bilbiie and Diego R. Känzig. "Greed? Profits, inflation, and aggregate demand". *Revise and resubmit, American Economic Journal: Macroeconomics* (2023).

Working papers

11. Konstantinos Gavriilidis, Diego R. Känzig, and J.H. Stock. "The Macroeconomic Effects of Climate Policy Uncertainty". 2025.
12. Diego R. Känzig, Maximilian Konradt, Lixing Wang, and Donghai Zhang. "Green Business Cycles". 2025.
13. Diego R. Känzig and Ramya Raghavan. "The Macroeconomic Effects of Supply Chain Shocks: Evidence from Global Shipping Disruptions". 2025.
14. Diego R. Känzig, Julian Marenz, and Marcel Olbert. "Carbon leakage to developing countries". 2024.
15. Diego R. Känzig and Charles Williamson. "Unraveling the drivers of energy-saving technical change". 2024.

Work in progress

16. Adrien Bilal, Emirhan Ilhan, Diego R. Känzig, Karsten Müller, and Chenzi Xu. "Climate Risks and Financial Stability: 1850–2024".
17. Adrien Bilal, Thibault Ingrand, and Diego R. Känzig. "Optimal Warming".
18. Adrien Bilal and Diego R. Känzig. "Prices and Quantities in a Warming World".
19. Adrien Bilal, Diego R. Känzig, and Krzysztof Lisiecki. "Climate Change and Mortality".
20. Jonathon Hazell, Diego R. Känzig, and Ed Manuel. "The Causal Effects of Transfers".
21. Diego Känzig and Tamar den Besten. "The Macroeconomic Effects of Tariffs: Evidence from U.S. Historical Data".