Christopher Tonetti - Research Statement

I am a macroeconomist and my primary research focus is economic growth. I also study household finance, labor, and life-cycle economics.

My growth research highlights the importance of the diffusion of information to economic growth. Taking diffusion into account shows why the welfare gains from international trade are likely to be larger than previously thought, why subsidies to technology adoption can actually contribute to long-run growth, and why giving consumers—instead of firms—ownership of user-generated data can spur innovation and improve welfare. I usually develop simple dynamic general equilibrium models to isolate specific economic mechanisms, then I build richer models that are calibrated to macro and micro firm data and used to perform policy-relevant counterfactuals. I use these models to better understand the sources of aggregate economic growth, to identify related externalities and market imperfections, and to design welfare-improving policies.

My household finance, labor, and life-cycle research leverages innovative data to better understand the forces that determine people's consumption, saving, labor supply, and insurance purchase behavior. A distinguishing feature of my research is the use of purpose-designed surveys that identify key parameters in structural models of individual choice. The survey methods that I have developed generate data that allow for an empirically-disciplined modeling of preference heterogeneity and state-dependent preferences. By estimating individual preferences, I've shown that long-term-care risk is a major driver of saving over the life-cycle, that improved long-term-care insurance would have high consumer value, and that older workers want to continue to supply labor at rates much higher than realized in the market.

Diffusion and Aggregate Economic Growth:

Living standards over the past few centuries have greatly improved due to economic growth. Much of the growth literature emphasizes that increases in productivity drive long-run aggregate growth and that innovation is the process that generates increases in productivity. Much of my research focuses on how the diffusion of technology contributes to growth. To study this, I've built models in which innovation and diffusion (a.k.a. adoption or imitation) are separate activities that firms invest in to improve their productivity. Motivating this line of research is the fact that many firms invest in and improve their productivity or quality over time, even though very few firms perform cutting edge R&D.

"Equilibrium Imitation and Growth" (JPE 2014) was an early paper to microfound the evolution of the aggregate productivity distribution with firms actively investing in adoption in equilibrium. This is in contrast to the prominent Nelson-Phelps models of diffusion that specified an exogenous differential equation that determined how technology flowed from leaders to followers. By developing a model in which diffusion was the result of choices, we made the simple point that low productivity firms have a stronger incentive than high-productivity firms to try and copy a technology in use by other firms in the economy and that this selection of low-productivity firms into adoption can contribute to aggregate growth. We also showed how the shape of the productivity distribution, which characterizes the adoption opportunities, affects the incentives for firms to invest in adoption. Finally, we highlighted that the decentralized equilibrium is inefficient because firms do not internalize that their productivity improvements can spill over to other adopting firms in the future. The flip side of this externality is that firms have an incentive to free ride, waiting for others to improve their technologies before investing in adopting those technologies.

Many papers in the international trade literature find surprisingly small welfare gains from trade. This is true of classic models and of the "new new" models that emphasize firm heterogeneity to connect to micro data. "Equilibrium, Technology Diffusion, Trade, and Growth" (AER 2021) was an early paper to explore how adding aggregate growth dynamics to modern international trade models changes the welfare gains from trade. We were motivated by evidence that there are within-firm changes in productivity in response to lower trade costs, whereas much of the literature focused on gains across stationary equilibria due to across-firm composition effects. We show how typical forces in static trade models (e.g., Melitz) can lead to increased aggregate growth in a dynamic model. Changes in trade costs affect the distribution of profits across firms and we provide a sufficient statistic linking moments of the profit distribution to the growth rate.

We further show that large welfare gains from international trade do not necessarily come from dynamic vs. static considerations per se, but from externalities that are at the core of growth economics. In an efficient dynamic economy the effect of trade barriers on growth is second order, but in an economy with inefficiently slow growth (the likely empirically relevant case), lower trade barriers that increase growth have large welfare effects. We also show that calibrating the model using firm dynamics moments—not just moments on cross-sectional heterogeneity—affects key parameters that quantitatively determine the size of welfare gains. Finally, a technical contribution of the paper is to solve for the equilibrium transition path of the economy after a reduction in trade barriers. This involved implementing numerical methods to solve a differential-algebraic system of equations (DAEs) that represents a non-stationary economic environment. We have published code and educational material to help others implement the techniques in their research.

While the previous two papers focus on the role of technology diffusion, in "Reconciling Models of Diffusion and Innovation: A Theory of the Productivity Distribution and Technology Frontier" (ECMA conditionally accepted 2020), we explicitly focus on how the interaction between diffusion and innovation determines the shape of the productivity distribution and generates aggregate growth. A key point of the paper is that even though innovation must drive long-run growth, changes in the adoption environment can influence growth by affecting innovation incentives. We focus on two ways in which adoption affects innovation. First, if innovators can profit from licensing their technology to adopters, cheaper adoption generates more licensees and makes innovation more attractive. On the other hand, cheaper adoption exacerbates the free-rider incentive facing potential innovators, so that on the margin they invest less in innovation today when the option to adopt in the future improves. This perspective that adoption can influence long-run growth pushes somewhat against the conventional wisdom that different forces underpin growth and development economics. One immediate conclusion is that adoption policies should not be studied in isolation for developing countries nor innovation policies in isolation for developed countries. Policies to foster domestic technology diffusion can influence long-run aggregate growth even in advanced countries at the technological frontier, but the effect these adoption policies would have on innovation behavior should be considered in their design.

Data is special because it is nonrival, meaning that the same data can be used simultaneously by multiple firms to improve their products. In general, nonrivalry generates externalities such that the decentralized production and use of the nonrival good is suboptimal. In "Nonrivalry and the Economics of Data" (AER 2020) we show how a property rights regime that resembles the current regime in the U.S. can lead to the simultaneous overuse of data within-firm (disrespecting consumer privacy concerns) and underuse of data across-firms (not achieving feasible productivity gains from scale). We show how laws that outlaw the sale of data achieve gains on the privacy dimension, but at the cost of reduced innovation that would arise from the broad use of data. Finally, we show that property rights in which consumers own user-generated data can achieve close to optimal allocations, as consumers balance their privacy concerns with the economic gains from selling data—which generates the broad use of data that is socially optimal. We highlight key features of data that require new modeling frameworks, distinct from those used to study ideas (the other nonrival good), and show how these features lead to guiding principles for the optimal design of data property rights, useful for considering laws like GDPR and the California Consumer Privacy Act.

In preliminary ongoing research, I'm continuing to explore the diffusion of information, theoretically and empirically. I'm studying how data nonrivalry affects optimal antitrust regulation with a focus on competition, innovation by incumbents, and entry. In **"Knowledge Diffusion Through Networks"** I'm studying the diffusion of knowledge in a specific context (cholesterol medications), linking panel micro data on doctors' prescription patterns to a new model of social learning on a network.

Life-Cycle Saving, Consumption, Labor Supply, and Insurance Demand:

Knowing why people behave as they do is critical to better understand the opportunities and risks they face and to find ways to improve their lives. A major barrier to identifying what drives a person's behavior is that a given action is often consistent with different reasons why someone would take that action. In my research, I design surveys that use detailed hypothetical scenarios to elicit how individuals would behave in contingencies that are highly revealing of their motives. We take care to deal with the challenges of working with stated-preference data by documenting the internal and external consistency of responses. To access and create the data needed to identify motives, I often leverage partnerships with the private sector (Vanguard Research Initiative), national administrative data registries (Denmark), and academic-private survey companies (Understanding America Survey).

Much of my life-cycle household finance research focuses on late-in-life saving. An elderly person might be saving because they want to leave a bequest or because they want to have money available to finance their long-term care (LTC) if they need it. Money is fungible and can be used for either purpose, so having a lot of money late in life does not reveal the motivation for saving. In "Long-Term-Care Utility and Late-in-Life Saving" (JPE 2020) we asked people how they would allocate wealth to purchase state-contingent assets that paid off only when in need of LTC or that could only be used to leave a bequest. Since these assets are not fungible like money, they reveal individuals preferences for leaving a bequest and for spending when in need of LTC. We combine this survey data with traditionally used wealth data to estimate (non-homothetic health-state-dependent) utility functions in a structural life-cycle consumption-saving model. We quantify the relative importance of these saving motives late in life and show that LTC risk is a significant contributor to why many elderly people keep saving deep into old age. Building on these findings, "The Long-Term-Care-Insurance Puzzle: Modeling and Measurement" shows that there would be large welfare gains if better LTC insurance were available in the market. Furthermore, preliminary results in **"Risky Insurance: Life-cycle Insurance Portfolio Choice with Incomplete Markets"** show that subjective beliefs of insurer nonpayment and other real-world features of the LTC, annuity, and life-insurance markets (e.g., no short sales, high loads) explain the patterns of insurance ownership in the data.

I have also contributed to understanding labor supply and earnings over the life cycle. In "Older Americans Would Work Longer If Jobs Were Flexible" (AEJ: Macro 2020) we show that Americans are willing to work into older ages than observed in data, even at significant wage cuts relative to their last job. Estimates of preferences from survey data allow us to remove a lack of desire to work as a reason for the lack of employment—pointing to labor-market frictions or disinterest from firms. Currently I am using Danish administrative data in **"Accounting for Job-to-Job Moves: Wages versus Values."** Preliminary results show many moves with sizable wage cuts; few such moves are compensated with a higher present discounted value of wages. Thus, many job-to-job moves are negative-value moves or reflect better non-wage job amenities. This is a crucial fact to understand the risk workers face over the life cycle, the efficiency of labor markets, and the optimal design of labor policies.

I am also developing new survey methods in **"Estimating Marginal Treatment Effects with Survey Instruments"** with an application to childbirth and female labor supply. We show how to design surveys to obtain causal estimates of treatment effects while accounting for unobserved heterogeneity and how to forecast the effect of counterfactual aggregate policies (e.g., childcare subsidies).