My research interests, broadly speaking, lie in the intersections of international economics, finance, and macroeconomics. I have been actively working on three lines of research with a strong curiosity in other topics generally related to my fields. I currently have five papers, including one publication at the Journal of Monetary Economics.

Research Agenda 1

My first line of research studies how multinational enterprises (MNEs) propagate or stabilize the transmission of macroeconomic shocks internationally, especially through the interaction between their internal capital markets (ICMs) and external capital markets across borders. My job market paper, titled ``Multinationals and Uncertainty: The Role of Internal Capital Markets,'' provides the first evidence that external capital markets in different countries are interconnected through the ICMs of MNEs in response to country-level uncertainty shocks. When a country-level shock raises the uncertainty of investment returns within the country, MNEs with subsidiaries operating in the country can stabilize the negative impact by substituting local external debt with foreign external debt through their ICMs without deleveraging.

My job market paper begins by investigating how would the ICMs of MNEs response to a country-level uncertainty shock, where I drive the optimal debt structure of a representative MNE and demonstrate the theoretical importance of subsidiary-level external debt in deciding the response. When a parent company faces agency problems from its foreign subsidiaries, subsidiary-level external debt can be used to incentivize additional monitoring from local lenders to alleviate the issue. In this case, a rise in the uncertainty of local investment returns can strengthen the monitoring incentive of the local lenders, which enables a MNE to partially substitute its subsidiary-level external debt with cheaper parent-level external debt without destroying the monitoring incentive. Without using the subsidiary-level debt for local monitoring, the uncertainty shock would only lift the risk premium that pressures a MNE to deleverage.

Guided by the theoretical framework, I test the different model predictions with rich data on parent-level consolidated capital structure and subsidiary-level unconsolidated balance sheet, using the Brexit process as a natural experiment. I document strong evidence that MNEs exposed to a country-level uncertainty shock are able to perform the external debt substitution substantially, without deleveraging at both parent and subsidiary levels. My findings suggest a novel stabilizing force involving the interaction between the ICMs of MNEs and external capital markets across borders.

In addition to uncertainty shocks, I am investigating if MNEs can play a special role in transmitting exchange rate shocks domestically in my work "Multinationals and Exchange Rates: Evidence from Switzerland" with Andreas Freitag. In my currently single-authored draft, I document the first evidence that foreign ownership matters in the transmission of exchange rate shocks to domestic sales. To identify exogenous changes in exchange rates, I utilize the unexpected abandonment of the minimum exchange rate by the Swiss National Bank in 2015 as a well-documented natural experiment, which produced a large and unexpected appreciation in the Swiss Franc (CHF), while the macroeconomic environment in Switzerland remained stable. Using the new available Analytical AMNE database from OECD that allows me to fully split Inter-Country Input-Output (ICIO) tables at the country-industry-ownership level and a Difference-in-Differences (DID) identification strategy, I find that the exogenous appreciation of CHF caused the domestic sales of foreign subsidiaries in Switzerland to become around 27% higher relative to those of the domestic-

owned firms over a period of two years. The significant increase cannot be explained by endogenously higher productivity of the foreign subsidiaries as the difference remains stable when comparing the foreign subsidiaries with equally productive subsidiaries of Swiss-based MNEs. In addition, the difference cannot be explained by import intensity as measured by the ratio of imported value-added in each country-industry-ownership sector's output calculated from the new ICIO tables. Given that the impact of exchange rate shocks tends to be decided by differences in productivity and the usage of imports, as I have demonstrated in a standard framework of variable markups, heterogeneous productivity, and imported intermediaries, my empirical findings suggest that foreign ownership itself matters in firms' responses to exchange rate shocks.

For the next step of the project, I am cooperating with my coauthor to employ granular transaction-level data from Switzerland to test why does the foreign ownership matter. Specifically, we aim to test two mechanisms: 1) Whether the relative increase in domestic sales can be explained by a different exchange-rate pass-through (ERPT) between the foreign subsidiaries and domestically owned firms, and, perhaps complementarily, 2) whether the relative gain in domestic sales is the result of different invoicing currencies between the foreign subsidiaries and domestically owned firms. We find the second mechanism particularly interesting since existing theory does not predict a different invoicing currency choice, given that both groups of firms operate in the same country. As a result, the mechanism could tie the choice of invoicing currency with corporate ownership structure, particularly the book currency of the parent company, as a new determinant. Because the parent company of a MNE is likely to use its book currency to raise group-level debt, it could be optimal for the MNE to invoice the majority of its internal transactions (e.g., internal debt, intra-firm trade, etc.) in the book currency of the parent company, which would affect the subsidiary-level ERPT and changes in sales following an exchange rate shock. The connection between invoicing currency and the ownership of equity capital can also yield interesting and important implications for open economy models.

Research Agenda 2

Related with how the ICMs of MNEs interact with external capital markets across borders, my second line of research studies the general role of financial intermediaries and corporate capital structure in the transmission of macroeconomic shocks. In my work "Uncertainty, Stock Prices, and Debt Structure: Evidence from the U.S.-China Trade War" with Ali Ozdagli, we utilize the 2018-2019 U.S.-China trade war as a laboratory to show that corporate debt structure matters in the transmission of macro uncertainty shocks to asset prices. Using a heteroskedasticity-based estimator with high-frequency financial market data to identify exogenous changes in uncertainty, we find that the rise in uncertainty due to the trade war has caused a significant decline in US stock prices: A trade war uncertainty shock that raises the Chicago Board Options Exchange's Volatility Index by two percentage points per annum (one standard deviation change) reduces US stock prices by about 0.9 percent. However, conditioning on non-bank debt, the effect is less negative as firms use more bank debt. The usage of non-bank debt does not have such mitigating effect.

We further discover that the mitigating effect of bank debt is concentrated among the so-called zombie firms – firms that are persistently unable to generate enough profits to cover their interest expenses. These firms have attracted growing attention from academic and policy circles as well as public media due to their potentially influential role in depressing economic growth, especially when bank credit is directed to keep the firms afloat. We estimate that a zombie firm that derives half of its capital from bank debt has no negative stock price reaction to a rise in uncertainty. Our

findings suggest that corporate debt structure matters in asset pricing and the transmission of macroeconomic shocks. Moreover, our results are consistent with the argument that bank debt provides insurance and flexibility for firms in bad economic times, especially for zombie firms.

Research Agenda 3

A common theme shared by my previous lines of research is that corporate debt structure matters in the transmission of macroeconomic shocks. My third line of research studies agency problems that can play an important role in the interaction between the debt structure and the transmission of the shocks. In my paper published at the Journal of Monetary Economics with Anna Chernobai and Ali Ozdagli, "Business Complexity and Risk Management: Evidence from Operational Risk Events in U.S. Bank Holding Companies," we examine agency problems associated with business complexity and limited internal monitoring capacity. Taking advantage of the 1996–1999 deregulations of U.S. banks' nonbanking activities as a natural experiment, we show that business complexity of US bank holding companies (BHCs) increases their operational risk. Unlike credit and market risks, where source of risk lies outside the firm, operational risk is created by sources internal to the firm and is a result of control failures. In particular, operational risk events are events result from inadequate or failed internal processes, people, or systems and include fraud, flawed business and market practices, failed transaction processing and process management, improper employee and client relations, and system failures. Utilizing a unique dataset that allows us to document origination dates, rather than realization dates, of operational risk events, together with a DID identification strategy, we find that greater deregulation-induced business complexity leads to higher losses from operational risk events in both the newly allowed nonbanking business lines and the core banking business lines of US BHCs. In addition, our results cannot be explained by a mechanical relationship between the increase in operational risk and the growth of the institutions. Our results also cannot be justified by any strategic risk taking because the increased business complexity does not improve performance significantly. These findings point to an overall weakening in risk management and internal monitoring capacity caused by a rise in business complexity, which creates significant losses due to agency problems internal to the firm. Our findings also motivate the agency problem faced by parent companies of MNEs in my job market paper from their foreign subsidiaries due to the organizational complexity of MNEs.

Future Plans and Other Interests

After the job market, I look forward to continuing my work on the intersections of international economics, finance, and macroeconomics. Specifically, I see several avenues for future projects based on my main lines of research. One such avenue is to study the interplay between the ICMs of MNEs and external capital markets across borders in response to other important shocks, such as credit supply shocks, monetary policy shocks, etc. Additionally, I firmly believe that the role of the ICMs of MNEs in the international financial markets deserve further attention. Considering MNEs are among the largest borrowers of global banks, questions such as whether the ICMs of MNEs work in the same or opposite direction of the ICMs of global banks in terms of generating international spillovers and whether the ICMs of MNEs can stabilize or propagate global financial cycles can yield fruitful research pipelines. Based on my coauthored work with Ali Ozdagli, I also plan to further investigate the special role of bank debt in the corporate debt structure and its macroeconomic implications.

Beyond my main lines of research, I have a strong passion to work on other topics generally related to my fields. One such example is my current research effort with Abhi Gupta, where we are using data on US military contracts during World War II and the Korean War to examine whether using the excess stock returns of military contractors to identify the expectation effect of government spending leads to a better estimation of the fiscal multiplier, and whether fiscal policy is more effective with and without an independent monetary policy.