Application: Digital Economics and AI Tutorial

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Graduate study

I entered the Economics Ph.D. program at the University of Virginia in Fall 2023 and am now a fourth-year student. My first-year coursework comprised two sequences each in macroeconomics, microeconomics, and econometrics, together with game theory. My subsequent training includes Advanced Macroeconomics I and II, Time Series Econometrics, Cross-Section Econometrics, International Finance, Topics in Growth Theory, and Numerical Methods. My official fields are macroeconomics and international finance.

Research interests and dissertation

My research asks how balance sheets, financial contracts, and information turn external shocks into macro-financial stress, and which implementable policies can contain that amplification. I combine quantitative macroeconomic models with micro and macro data, with an emphasis on small open economies. A provisional title for my dissertation is *Financial Amplification and Macroeconomic Policy in Small Open Economies*.

My job market paper, *Doom Loops: Bank Regulation and Macroprudential Policy*, studies a two-way feedback loop between sovereign risk and weak private credit. Loan defaults erode bank capital and raise expected public recapitalization costs; sovereign stress then reduces the value of government bonds held by banks, tightens credit supply, and further weakens private balance sheets. I document this interaction in European data and build a quantitative model in which banks finance private credit, hold sovereign debt, and face capital requirements. The policy exercise compares state-contingent capital regulation with ex post recapitalization. It asks when an ex ante rule can keep the economy out of the region in which bank losses and sovereign risk reinforce one another, and when recapitalization remains necessary after a large shock.

Two related projects could become additional dissertation chapters. *Engel Curves and the Price of Local-Currency Sovereign Debt* studies how nonhomothetic demand changes the real payoff of nominal government liabilities after external shocks. *One Instrument, Many Borrowing Constraints* studies policy when asset-based and cash-flow-based constraints coexist but the regulator has only one common instrument and is uncertain about the composition of contracts. Together, these projects examine how observable heterogeneity in balance sheets, spending, and contracts changes the incidence of shocks and the design of macroeconomic policy.

AI, text, and economic measurement

A growing part of my research uses language models to measure economic information that standard datasets do not record. My main project in this area asks whether financial markets interpret the same apparent monetary-policy direction differently depending on who communicates it. A hawkish statement may convey a tighter policy path, but it may instead reveal stronger growth, greater inflation pressure, or a different assessment of risk. Collapsing these components into one sentiment score can therefore obscure the economic signal that moves asset prices.

I have assembled 2,794 policy-relevant, non-duplicate Federal Reserve speeches on 1,805 dates between 2005 and 2022. I apply FOMC-RoBERTa sentence by sentence rather than truncating long speeches, and measure each speech's stance relative to a consensus formed only from prior speeches by other officials. I then match the resulting signals to sovereign yields, exchange rates, equities, and sovereign credit risk in 18 emerging economies. The matched panel contains 32,454 country-date observations.

The preliminary evidence points to a role-dependent signal. A one-standard-deviation hawkish deviation by a regional Reserve Bank president is associated with declines of 0.37 and 0.45 basis points in five- and ten-year emerging-market yields, while the corresponding associations for non-Chair Board members are increases of 0.48 and 0.33 basis points. The regional signal also coincides with currency appreciation, stronger equities, and narrower sovereign credit spreads. These estimates are descriptive rather than causal, but their cross-asset pattern suggests that a scalar hawkishness measure may mix policy guidance with information about the economic outlook.

The next stage separates these components explicitly. I have designed a frozen, structured LLM protocol that labels policy-path guidance, inflation outlook, real-activity and labor-market outlook, uncertainty, financial-stability risk, attribution, horizon, conditionality, and speaker confidence. The design prevents market outcomes and post-event information from entering the prompt. I will evaluate the labels on held-out speakers and time blocks, compare them with transparent dictionaries and alternative frozen encoders, and use an independently coded human sample to measure field-specific errors. Model selection will not depend on which specification produces the largest emerging-market response. This project treats AI output as measured data—with a validation problem and economically meaningful measurement error—rather than as ground truth.

A second project uses AI-assisted coding to recover borrowing constraints from SEC-filed credit agreements. A frozen validation sample contains 100 agreements from 96 nonfinancial issuers. The coding protocol distinguishes borrowing bases, debt-to-earnings covenants, coverage tests, and state-contingent covenant activation. Independent human coding and confusion matrices will discipline the machine labels before those labels enter the quantitative policy analysis. The economic objective is to measure the contract distribution that determines whether one common macroprudential instrument relaxes or worsens the relevant financial externality.

Interest in the tutorial

These projects have made three questions central to my research: when does an AI model create an economically useful measurement rather than a high-dimensional proxy; how should model error and human validation enter economic inference; and how might machine interpretation change the production and use of policy and contractual information? The NBER tutorial would help me place these measurement problems within the broader economics of AI, learn from research on organizational adoption and information production, and develop designs that study AI as an economic technology rather than only as a research tool. I would contribute an international macro-finance perspective in which the value of a signal depends on the balance sheets, institutions, and policy constraints through which it is transmitted.

My dissertation committee consists of Eric van Wincoop, Eric Young, and Anton Korinek.