Application to Digital Economics and AI Tutorial

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Dear Organizing Committee,

I'm Shuaichen Liu, currently a 3rd year Economics PhD student at the University of Virginia. I'm writing to apply to participate in the tutorial on Digital Economics and Artificial Intelligence. I am currently working on projects concerning AI providers' pricing and support policies, and pension finance with AI tax in an aging economy.

I have completed the first two years of required coursework and passed the first-year qualifying examination. I've taken field courses in macroeconomics, international finance, industrial organization, public economics, development economics and econometrics. Especially, I learned a lot about AI in economics from the public economics course taught by Professor Lee M. Lockwood and the empirical macro course taught by Professor Basil Halperin. Simultaneously, I've been attending the human-machine intelligence (HMI) seminar series, organized by Professor Anton Korinek and the other two professors just mentioned. I'm highly influenced by their passion and research about how AI shapes economic policies and how households, firms, and governments deal with the challenge and problems raised by AI.

Currently I'm working on two projects related to AI. One is *Pay-As-You-Go Lifecycle Pricing and Complementor Investment*, discussing how an AI provider's promised usage price and support period affect developers' choice between portable applications and designs tailored to a particular model. This paper has been accepted for presentation at Asia-Pacific Industrial Organization Conference (APIOC2026). I assume that tailoring an application to a specific AI model can create additional value for the business, but it requires upfront investment and makes later migration harder. The question matters because the economic benefits of AI depend partly on developers' willingness to invest in applications that turn AI from a general purpose one to serve for special purposes, like the automated call system used by banks. Expectations about future prices and model retirement can therefore affect developer's investment decision and how much value AI creates for downstream businesses.

I develop a sequential model with one AI provider, an application developer, and other users purchasing access through the same public API. Before the developer chooses its architecture, the provider commits to a common pay-as-you-go price and a period of continued support for the older model. Support begins when a usable successor becomes publicly available, and the developer chooses migration effort during this overlap. The model takes successor arrival and

quality as given and assumes that specialization requires a fixed cost and reduces migration productivity. Maintenance costs increase with support duration and workload. I solve for the subgame-perfect equilibrium by backward induction and compare it with a social planner choosing the same contract terms while respecting the developer's investment incentives.

In the parameter region studied, the provider chooses a higher price and shorter support period than the planner. Also the provider's optimal contract will induce higher portability, while the planner's will induce more specialization. Because the price is public, encouraging specialization also changes revenue, demand, and support costs across the broader user market, while the provider does not capture all the resulting benefits. A second counterfactual changes the game sequence, holding the planner's support period fixed and allows the provider to set prices after investment. Anticipated repricing then induces portability, showing why continued access alone cannot protect investment. A binding price commitment can implement the planner's preferred contract, although the provider's profit-maximizing choice remains portable.

The other is *Financing retirement in the age of AI*, asking whether taxing firms' purchases of AI services can help finance pensions and reduce the need to delay retirement in an aging economy. In an aging economy, governments choose to delay the prescribed retirement age because of two things, one is to sustain the labor used to maximize output, the other is to reduce the funding pressure of pension. In my settings, AI could increase the labor productivity so that firms could reduce the labor demand and further reduce the overall labor demand in the aging society, resolving the first issue of delayed retirement. Taxing AI usage could let the government finance pension with a second source and therefore depend less on the labor income tax to resolve the second issue, but it could also discourage AI adoption and affect investment. So I aim to find the optimal AI tax rate for the problem and examine if delayed retirement would be unnecessary under the tax system.

I develop a general equilibrium model in which the government jointly chooses labor taxes, an AI tax, and the retirement age, accounting for firms' adoption decisions and households' work and saving choices. The project's contribution is to assess whether AI's productivity gains can translate into more retirement time while accounting for the economic costs of raising pension revenue. Holding pension benefits fixed, I will compare systems financed by labor taxes alone with systems that also tax AI use. The analysis examines when the optimal AI tax is positive, whether it reduces the need to delay retirement, and how the gains and costs are distributed across generations and households.

The tutorial would help me place these projects within current research on digital economics and AI. I would especially value discussions about how to connect models of provider contracts to evidence on developers' adoption and investment, and how to evaluate AI

taxation when firms and households adjust their behavior. Learning from researchers across fields would help me sharpen these questions as the projects develop. I also value the opportunity to exchange ideas with other graduate students and attend the associated Digital Economics and AI meetings. Thank you for considering my application.

Best regards,

Shuaichen