



Paulo Somaini
Knight Management Center
655 Knight Way
Stanford, CA 94305-7298
USA
T +1 650.723.6451
F +1 650.724.7402
soma@stanford.edu

Dear Colleague,

It is a pleasure to recommend **Yufei Wu** for Assistant Professor positions. Yufei is a Public Finance student interested in health insurance markets.

Yufei took my Industrial Organization class and became particularly interested in the tools for estimating dynamic games of oligopolistic competition. In her work, she uses these tools to analyze the pricing strategies of insurance firms in Medicare Part D. I have enjoyed advising Yufei on this project. She is a promising scholar. I am confident to recommend her to economics departments, business schools and policy schools.

Medicare Part D is the market for prescription drug insurance for Medicare beneficiaries. Insurance plans are offered by private insurance firms offer plans with varying coverage, formularies, and premiums. There are 34 separate geographical markets. Firms have to charge the same price for the same plan to all consumers in a given market, but they can offer different plans and set different premiums across markets. In 2014, there were 37 million Part D enrollees. The number of plans per market varies between 40 and 55. Beneficiaries have to actively choose one of these plans when they enroll in Part D, but they are defaulted to the previous year's choice once they are enrolled. Academic economists have studied the enrollee's choice problem. One of the main findings is that consumer choice exhibits inertial behavior. The frequency of switching is low despite large differences and year-to-year changes in plans' premiums (Hoadley et al., 2013; Miller and Yeo, 2015; Polyakova, 2015).

Yufei's job market paper analyzes the supply response to consumers' inertial behavior. Insurance firms face two different incentives. On one hand, they have incentives to price high to take advantage of their current consumer base. On the other hand, they have incentives to price low to build a larger consumer base that can be exploited in the future. These harvest and investment motives counteract each other. If firms are myopic or discount the future heavily, their investment motive will be weak and they will set high prices. If firms are forward-looking, the investment motive will be strong and prices will be lower. The key parameter that determines which effect dominates is the firms' discount factor. This is the parameter that Yufei estimates in her paper.

The job market paper uses administrative data from the Centers by Medicare and Medicaid Services (CMS). The beneficiary data contain demographic information, plan choice and details on drug expenditures for a 20% sample of enrollees. The plan data contain premiums, deductibles and other financial characteristics (e.g. gap coverage, cost sharing). The data span the years of 2006-2011.

Yufei uses data on individual expenditures, demographics and plan choices to estimate the expected plan cost conditional on plan and enrollees characteristics. She also borrows the demand system from Polyakova (2015) that features switching costs. Therefore, consumers will exhibit inertial behavior, and current demand will depend on last years' market shares. The demand system and the expected cost function allow her to predict market shares and variable profits for each plan as a function of lagged market shares and current prices. These are key inputs for the estimation of the dynamic game.

To estimate the discount factor of insurance firms, Yufei uses an approach proposed by Bajari, Benkard and Levin (BBL, 2007). To calculate a firm's present value of profits, it is necessary to know how competitors will behave in the future. BBL propose to estimate a set of empirical policy functions that describe firms' pricing strategies as a function of the market state. In a typical model with consumer inertia, the market state is the vector of lagged market shares. In Yufei's paper, different group of consumers have different expected expenditures and result in different variable profits for insurance firms. Therefore, the relevant market state is a long vector of market shares by consumer type. Yufei creates a set of six bins of consumers according to their risk-score and gender and keeps track of each plan's market share for each of these six bins. Following the ideas in Weintraub, Benkard, Van Roy's, 2008 paper, she estimates a policy function that depends on each firm's market shares in each of these bins, the market shares of all firms in the same product category, and the plan's characteristics. These policy functions can be used to forward simulate each firm's present value of profits for each possible strategy and each possible discount rate. Yufei performs this forward simulation for 100 alternative strategies. Following BBL, her estimator of the discount factor minimizes the excess profit by using an alternative strategy instead of the observed one. She finds that the discount factor is 0.946, which suggests that firms are forward-looking and have incentives to invest in obtaining a large consumer base that they can benefit from in future periods. The investment effect dominates, and equilibrium markups are lower than those in a counterfactual with no inertia.

Yufei uses her estimates to simulate the effect of three different policies. She first considers a cap of 10% in the year-to-year increase in premiums. This regulation would limit firms' ability to increase prices after they enter the market while still incentivizing firms to invest in a larger consumer base. She finds that this cap would reduce average prices on the on-set of the market without affecting the prices in the long run.

The second policy she considers is the inclusion of a public option. A public option would increase competition for new enrollees. She finds that this policy reduces average prices but still exhibits low prices at the on-set and high prices in future periods.

The third policy she considers is removing the risk-corridors. The intuition is that risk corridors incentivize firms to price aggressively at the on-set of the market without having to worry about the pool of enrollees it will attract. Yufei finds that this policy has negligible effects on prices. Overall, she concludes that capping price increases, and including public options are viable ways to improve consumer welfare.

In sum, I expect Yufei to have a very good market in the short run and to become a productive researcher in the long run. Her job market paper is a clear example of how she is able to answer an important policy question by gathering the right data and using adequate econometric tools and sensible economic analysis.

Sincerely yours,

A handwritten signature in black ink, appearing to read 'Paulo Somaini', with a stylized flourish at the end.

Paulo Somaini