

November 10, 2014

To whom it may concern:

I am writing this letter to strongly recommend Youngjun Jang. Youngjun is an empirical IO student interested in technology issues. His job market paper employs both reduced form and structural empirical analyses to provide an interesting view of how one market – the Korean retail gasoline market – has been affected as mobile technologies and a government intervention have made consumers more informed. It's an interesting and impressive paper and should make him a strong candidate for jobs at top economics departments and business schools.

I first became aware of Youngjun when I came across his stellar resume while serving as the head of our admissions committee: he had been a silver medalist at the International Math Olympiad in high school; earned a scholarship to Stanford; and had an impressive record there in both math and economics. When he arrived at MIT it was satisfying to see that he indeed had the mathematical talent his resume suggests: he was one of just three students to get an A+ in the game theory class I teach as part of our first year micro sequence. It was even more gratifying to see that he also had a real interest in economics. He had little exposure to applied economics papers as an undergraduate, but diligently read many of them in that first semester in my graduate IO course and did well in both the theoretical and the empirical parts of the class, again earning one of the top three scores in a class of 17. By the time he got to general exams Youngjun did not follow the path of many students with his background and work in theory. Instead, he was convinced that he'd like to do applied work. I was delighted that he chose to work in IO.

Youngjun's job market paper is motivated by a general interest in how markets will be affected as technologies make consumers more informed. The paper analyzes this issue in the context of the Korean gasoline market. It is a great environment to study for a couple reasons. First, the market may provide a glimpse into the more-informed future because Korean government established a real-time gasoline price database in 2008 which has taken off and is now accessed via smartphone apps, in car GPS navigation systems etc. Second, Youngjun has been able to bring together a number of different data sources to produce an unusually rich dataset: he has years of daily price data for all gas stations in several regions over the two-plus year period in which smartphone penetration went from almost nothing to over 50%; he has daily quantity data from a subset of stations obtained through a credit card provider; and he has region-specific time series data on smartphone penetration obtained from a mobile phone provider.

At first glance, improved consumer information doesn't seem to have had much of an impact on the Korean retail gasoline market. If anything, average markups show a slight increase if anything. And price dispersion also does not seem to have declined. It is commonly thought that the Korean government's database has led to a substantial improvement in consumer information, so this is something of a puzzle. Three potential explanations immediately come to mind: (1) maybe the first glance is misleading because it concerns distribution of prices charged in the market not the prices consumers actually pay; (2) maybe the facts are right and the explanation is simply that prices haven't changed because consumers don't actually use information technologies all that much; and (3) maybe neither (1) or (2) is true, so the economics of the market isn't as simple as better-information-gets-us-closer-to-the-law-of-one-price, and the puzzle is interesting and can teach us something.

Youngjun's paper starts with descriptive statistics on how retail markups and price dispersion have changed and he exploits the quantity information that he obtained to provide both unweighted and quantity-weighted measures of markups and price dispersion. Quantity weighted measures do have trends that differ from the unweighted measures in the expected direction, but the magnitude of the both effects just mean that the facts are that dispersion and markups have been approximately flat (whereas the unweighted numbers make it look like they've increased). So the answer is not (1).



Youngjun also presents several pieces of evidence in his reduced-form section to argue that the answer is not (2). The simplest of these are statistics on website access and smartphone app downloads suggesting that a nontrivial fraction of Korean drivers are accessing the government gas price database. But he also has some interesting statistical evidence. He runs a simple IV regression to show that quantities purchased seem to become more sensitive to the difference between a firm's price and the lowest price in its market. Any my favorite piece of evidence is a set of tests for unimodality which suggest that the distribution of prices more often has a nonunimodal shape in the later period. This would be consistent with demand having changed in a way that leads some stations to set low prices to try to attract highly informed consumers while others give up on these consumers and mostly serve less informed consumers at higher prices.

The largest part of his paper is then devoted to estimating a sophisticated structural model using both demand- and supply-side moments. The model assumes that consumers are heterogeneous in three ways. First, they differ in their geographic preferences. Consumers are assumed to have ideal purchase locations that are uniformly distributed on a grid overlaid on a map of the region and to have Hotelling-style disutility of buying at stations away from their ideal point. Second, they differ in informedness with some fraction a being highly informed consumers who know all prices while the remaining $(1 - a)$ just know two prices (assumed selected at random from a distribution that places higher probability on knowing prices at locations closer to their ideal point.) Third, they have standard logit-style idiosyncratic taste shocks. He cannot do a plain vanilla implementation of BLP exploiting the one-to-one relationship between market shares and unobserved qualities because he only has quantity information for a subset of the stations. So he instead uses a variant of this technique assuming that the unobserved attractiveness ξ_{ij} of each station is constant over the course of a week so that he can use observations of quantities from multiple days within a week to back out unobserved qualities.

The estimates from his model are that the number of highly informed consumers has increased from 1.7% to 11.4% over the course of the sample, which is in line with the statistics he presented earlier on web access and app downloads. Thus, one conclusion is that yes the Korean gasoline market is providing an example of what happens when information services and mobile devices substantially improve consumer information. Another result of the estimation is evidence on consumer preference heterogeneity – consumers are estimated to have fairly strong geographic preferences. To bring the focus back to the initial puzzle – why haven't we gotten much closer to the law-of-one-price – he does some counterfactual simulations where he examines how equilibrium prices levels and price dispersion would be expected to change when the mass of highly informed consumers increases (given the estimated degree of geographic and idiosyncratic preference heterogeneity that is also present). Here, he finds that the lack reductions in price levels and price dispersion is not paradoxical. Intuitively, in a market like this some firms will choose to serve the highly informed consumers at low prices while most largely ignore this (small) subpopulation. The net effect on markups of such a change is not clear. In his simulations he finds that equilibrium markups actually (slightly) increase and first and only turn down once the fraction of highly informed consumers reaches 20%. All in all I think it's an impressive paper that provides a nice insight on why the information technology revolution might or might not have the effects that we would naively expect.

Somewhat contrary to my initial expectations I think that one of Youngjun's greatest strength as an economist has turned out to be the ability he has shown to identify and talk people into giving him access to interesting data. (He must be savvier in Korean ways than he is in the US, where he is perfectly fluent in English but does not strike one as well-suited to walking into halls of power and talking executives or government officials into sharing data.) He is working on several additional projects exploring a variety of other new datasets. One is a behavioral IO project that uses related gasoline data – transaction level data on gasoline prices – to examine the tendency of consumers to tell gas stations that they want to purchase a round-number value amount, e.g. 50,000 won, rather than filling their tanks. Another is an economics-of-education project which uses data on the distribution of scores on the Korean equivalent of the SAT to examine how outcomes changed (on average and separately at different quintiles) when the Korean government mandated that cities switch from assigning students to high schools with complete ability grouping (assigning by entrance exam scores) to assigning them in a completely random manner.

It's very neat quasiexperimental variation because the Korean government mandated the change in different years in different cities and is sufficiently powerful to be able to mandate that the change apply to ALL schools in each city whether public or private. And he has another project on the same dataset looking at the gender gap in mathematics and how it was affected by another government-dictated reform which involved a substantial shift from gender-segregated schools to coeducation.

On the teaching side we've used Youngjun in a wide variety of roles. At the Ph.D. level he has TA'd both my theory-oriented IO class and Paulo Somaini's course which focuses on structural empirical methods. At the undergraduate level he has TA'd principles, intermediate micro, and game theory. Youngjun had little experience with teaching and public speaking prior to graduate school, but works hard on his teaching, has a good rapport with students who appreciate his evident concern for their understanding. He now usually gets good ratings. (In his best semester he got a 6.4 (out of 7) as Muhamet Yildiz's TA in undergraduate game theory – a course for which Muhamet got a 4.2 and the other TA got a 4.0.) He should do fine in an economics department or a business school environment. (He does still tend to be under confident in answering questions and has not fully shaken his Korean upbringing in that his first reaction can be to puzzle over what subtle flaw a distinguished faculty member has identified rather than considering whether the questioner is just confused.) Personally, Youngjun is a very nice, humble guy who will be a pleasure to work with and who will happily put a great deal of effort into any teaching and administrative tasks he's given.

In summary, Youngjun is a very good prospect. He has an interesting and technically sophisticated job market paper. He has good technical and practical skills. He'll be a very good citizen wherever he goes. I urge you not to pass him up.

If you have any questions at all please feel free to contact me.

Sincerely,



Glenn Ellison