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The role of the university for spatial sorting

It is by now a well-known fact that cities differ in terms of skill distributions and wage levels (Berry and Glaeser, 2005; Eeckhout et al., 2014; De La Roca and Puga, 2016; Carlsen et al., 2016). Spatial sorting occurs when workers with different types of skills show different location patterns and where highly skilled workers predominantly locate in urban areas. Eeckhout et al. (2014) find that urban areas in the US show extreme skill-complementarity so that they have large numbers of highly skilled workers but also large numbers of workers with low skill-levels. The precise mechanisms behind spatial sorting are unknown; although attempts at decomposing whether sorting on observable or unobservable factors are more important have been made (De la Roca, 2016; De La Roca and Puga, 2016; Combes et al., 2008). For instance, De la Roca (2016) points to that sorting may occur through the higher education system if better schools are located in bigger cities, although he does not investigate this any further. This is possible since when college enrollment is high, students try to distinguish themselves by entering more prestigious higher education establishments (Dale and Krueger (2011)). Then if better schools are located in urban areas, we may see sorting of students into better schools/urban areas already before labor market entry.

Studies that try to infer spatial sorting on workers moving between local labor markets may then underestimate the magnitude of sorting because they do not consider this pre-labor market sorting. For the US, Winters (2011), finds that it is mainly college towns that exhibit population growth and shows that it is due to that these cities attract students and then retain these after graduation. The issue is highly relevant as the location decisions of highly educated workers have been deemed one of the major drivers of spatial inequalities and regional divergence in modern times (Moretti, 2012). In effect, this implies that regions with

large shares of highly educated workers show higher employment growth as well as higher levels of innovative activity, whereas those with lower shares lag behind in terms of economic development.

In Sweden, as in many other countries, the more prestigious universities are located in or around urban areas. Sweden is an interesting country to study as it experienced a large expansion of its higher education system from 1977 onwards, with the introduction of a large number of university colleges during the coming decades (UKÄ, 2016). One purpose of these new university colleges was to provide the local labor markets with competent workers within key regional industries (Prop, 1975:9)[1]. Previously, the university system was centralized and most higher education institutions were located in or near urban areas. The expansion led to the establishment of primarily regional university colleges. Since the early 1990s, the number of study places has doubled, and most of this expansion has occurred at the newer regional universities and university colleges.

In this paper, I investigate how the geographical distribution of universities leads to spatial sorting. Students apply to different universities and differ in their probability to gain admission. I use detailed admissions data on each applicant's rankings of universities and programs that should generate strategy-proof measures of applicant's preferences over universities. Applicants are admitted based on simple rules that allocate applicants to the available number of study slots, which ensures that admission is as good as random across admission thresholds. I use this randomness to study the effect that admittance has on the probability to stay in the study locality 7-9 years after the applicant first applied to university.

[1] Other reasons were the uneven social recruitment to higher education and capacity constraints at existing universities.

As I do not have access to the full set of rules[2] that determine admission, I employ a fuzzy regression discontinuity design to estimate a local average treatment effect[3]. These estimates are informative of how the marginal student's location decision 7-9 years after application responds to being admitted to their preferred university. The key assumption is that individuals do not have precise control over crossing the threshold. In the Swedish case, this can be considered true as the cut-off point varies for each semester and program and depends on student demand[4]. Hence, at the margin, acceptance is random and admitted students should not differ markedly from those that were not admitted in terms of either observable or unobservable characteristics. In effect, the empirical strategy implies that I use instruments to control for selection bias into universities, but also that I use information on the applicants' rankings of universities to control for that applicants differ in their preferences for universities and local labor market regions.

It is not a priori obvious how the admission process translates into a higher probability of staying in the university location post-graduation. Due to that applicant' choices should be strategy-proof; individuals should not apply to a university and a program that they do not wish to attend. Ex ante, this implies that their choices should be utility maximizing – at least in the short run. At the university location, students gather location-specific capital in the form of friends, networks and preferences for local amenities (Krupka, 2009) that affects their attachment to their study locality. At the end of the university studies, the student decides to stay or leave. One may argue that the location-specific capital that the student has gained during his or her studies is now one factor that makes it more costly to leave and will

[2] One confounding factor is that the Swedish university system allows applicants to also compete for admission on a standardized test (SweSAT) so that some students with lower grades than what is required are admitted.
[3] The research design largely follows Öckert (2010) and Kirkebøen et al (2016) but applies it to spatial sorting rather than returns to education.
[4] Even students with a maximum GPA of 20.0 cannot be certain, as some programs are so popular that a lottery decides who gets admitted.

convince some graduates to stay in their study region rather than to return home or move to a new location. However, the probability of staying in the study locality post-graduation is likely also contingent on the strength of the local labor market as it affects the number of available job opportunities and may also be a determinant of university choice (Dotti et al., 2013).

References:

Berry CR and Glaeser EL. (2005) The divergence of human capital levels across cities. *Papers in Regional Science* 84: 407-444.

Carlsen F, Rattsø J and Stokke HE. (2016) Education, experience, and urban wage premium. *Regional Science and urban economics* 60: 39-49.

Combes P-P, Duranton G and Gobillon L. (2008) Spatial wage disparities: Sorting matters! *Journal of Urban Economics* 63: 723-742.

Dale S and Krueger AB. (2011) Estimating the return to college selectivity over the career using administrative earnings data. National Bureau of Economic Research.

De la Roca J. (2016) Selection in initial and return migration: Evidence from moves across Spanish cities.

De La Roca J and Puga D. (2016) Learning by Working in Big Cities. *The Review of economic studies*.

Dotti NF, Fratesi U, Lenzi C, et al. (2013) Local Labour Markets and the Interregional Mobility of Italian University Students. *Spatial Economic Analysis* 8: 443-468.

Eeckhout J, Pinheiro R and Schmidheiny K. (2014) Spatial sorting. *Journal of Political Economy* 122: 554-620.

Krupka DJ. (2009) Location-specific human capital, location choice and amenity demand. *Journal of Regional Science* 49: 833-854.

Moretti E. (2012) *The new geography of jobs*: Houghton Mifflin Harcourt.

Prop. (1975:9) Regeringens proposition om reformering av högskoleutbildningen m.m.

UKÄ. (2016) *Universitet och högskolor*. Available at: http://www.uka.se/fakta-om-hogskolan/universiteten-och-hogskolorna.html.

Winters JV. (2011) Why are smart cities growing? Who moves and who stays. *Journal of Regional Science* 51: 253-270.