Inter-regional graduate migration in Colombia: An approach using subjective expectations

Andrea Catalina Blanco M

University graduates are an important source of human capital. This kind of capital is determinant for regional development. The regions that receive this capital, improve their economic performance, become more competitive and start innovation and economic growth processes while the regions that lost it will remain lagged. Moreover there is double way causality between migration flow of human capital and the innovation performance of a region (Faggian and McCann 2009).

There is a vast literature both theoretical and empirical about human capital as a regional development strategy and about the determinants of the high skilled migration, however there is much less research on what are the determinants of migration of University graduates to less developed regions. Some important dynamics that could lead to regional development policies arises from this opposite flow, for example how the rural areas could attract and retain human capital?

In Colombia due to the curse of the natural resources, some regions remain lagged in social and economic development, despite having important resources during the last 30 years. University graduates concentrate in the main cities, where the universities are located, then for some of the university graduates first migration decision is in which main cities study. Since human capital is a key factor, understanding how university graduates decide to migrate helps to design tailored regional development policies. The studies about skilled internal migration in Colombia are scarce, some of them are based on the success of immigrants of other regions in the capital city (Romero 2010) and the other analyses return migration of university graduates who do postgraduate studies abroad to their origin regions (Cepeda Emiliani 2010). To the best of my knowledge there is only one study about the internal migration behaviour of actual university graduates (Gomez Caceres 2015). This study shows where do the university graduates migrate after graduation, and who are those who migrate, however what regions must do to motivate university graduate migration is a question that remain unanswered.

I estimate the effect of the difference in wages, family characteristics, individual characteristics and the perception of amenities and provision of public goods in origin and arrival destination on the individual probability of migration from Bogotá (Capital city) to Arauca, Quibdó and Riohacha (three less developed cities) using an OLS and GLM models. In order to check how much unobservable individual characteristics weight I include an individual fixed effect model. I found that the difference in wages as well as the amenities in destination and the level of security in origin increase the probability of migration. Besides, the individual unobservable effects also affect considerably the decision of migration.

I make three contributions to the literature of graduate inter-regional migration: (i) Studying the opposite flow of migration from more developed to less developed areas; (ii) Using subjective expectations of migration and job opportunities in source and arrival destination instead of estimated probabilities; and (iii) Including perception of amenities not only in source by in arrival destination

Motivation for migration requires understanding expectations in origin and in arrival destination. It is what job opportunities and wages do the University students expect. Data on expectations is not common in developing countries as Colombia. I design a unique survey and data collection on subjective expectations of University students in Colombia in which 747 students report their wage expectations, probabilities of job finding and answer questions in which are described complete scenarios of migration. These scenarios allow obtaining probabilistic predictions of university student migration intention given certain conditions of a job offer.

After the elicitation of the probabilities of migration I focus on the determinants of a possible migration, first I start with the differences in wages between Bogotá and the offered salaries in three different cities: Arauca, Quibdó and Riohacha, these three cities are oil royalties receptors. Next I include personal characteristics and finally I include the set of amenities, focusing specially in the provision of public goods. I start with the perceptions of security conditions in Bogotá and in the three proposed cities. Finally I asked about the

perception of the availability of schools, access to hospitals and existence of good roads in source and arrival destinations.

Few surveys includes data on subjective expectations, traditionally the questions are addressed to obtain qualitative responses that lead to non-comparable responses. In migration intention studies, migration intentions questions of the surveys are asked using different versions of a Likert scale. For example in surveys as Gallup world poll use the words "likely to move" "unlikely to move" "don't know" and "refuse to answer" (See Dustman and Okatenko 2014) other surveys like the British Social Attitude and Survey and International Social Survey Program uses a more informative scenario, giving the reasons for migration however the answers use a likert scale coded from one to five (See Drinkwater and Ingram.2009). In the German Socioeconomic Panel (GSOEP) the question of migration intentions uses different words as "enthusiastic" , "yes but depends" , " rather not" or "absolutely not" (See Burda et al 1998). These answers although informative cannot be compared across individuals. The word "likely" could have different meanings for two different individuals. Another drawback is that the information needed to do economic analysis about expectations is not extractable from qualitative expectation data.

The probabilistic scale has desirable properties, like the advantage of using algebra probability that allow testing internal consistency of the elicited expectations about the occurrence of certain events. Moreover the economists could compare the elicited expectations with actual events and give conclusions about subjective expectation and realities. (Dominitz and Manski 1997, Mackenzie et al 2013)

The expectation reported by a student will be more accurate if the scenario is fully defined. (Manski 1999), in a fully defined scenario, questions ask for a probabilistic prediction of the occurrence of an event given that scenario. In the survey I define two types of scenarios. First one includes a hypothetical situation, it is the student have been graduated and being in the job search for about a month, then the question is followed by a complete description of a Job offer in Arauca, Quibdó and Riohacha, the job description includes the length and type of the contract, the number of monthly salaries that will be received, the distance of the cities from Bogotá by plane and finally the monthly wage received.

The question used to elicit probabilities of migration was the following:

"Imagine that you have been recently graduated and are on the job search for about a month. Then you receive three job offers to work in three different cities: Arauca (Arauca), Quibdó (Chocó) and Riohacha (La Guajira), all of them are one hour away from Bogotá by plane. The type of contract specifies that your employer will pay your health insurance and your pension fund; you will receive 14 salaries yearly and is a one year contract. Now consider: what is the percent chance that you will accept the offer in each of these cities if the salary is 1 million COP?"

The students had this grid to answer

City	Percent chance to move If Salary is 1.000.000 COP
Arauca (Arauca)	
Quibdó (Chocó)	
Riohacha (La Guajira)	

Then the second question is formulated in the same way but the salary rises up to 1.6 million COP, third question ask for the percent chance to accept the offer if the salary is 2 Million COP and final question ask for the percentage chance of accepting the offer if the salary is 2.5 million COP.

The selections of the wages were made according to the data on current first salaries of graduates collected by the Colombian Ministry of education and with I the data reported by el empleo.com a well-known job website in Latin America. The intention of the four fixed salaries that I use where to have these reference salaries and design four different salaries in between the ones presented by job portals and the ones presented by the Ministry of Education. The selected salaries were 1 million COP, 1.6 Million COP, 2 Million Cop and 2.5 Million COP.

Methods

After the probability of migration is elicited next step is to know what determinants increase or decrease such probability of migration. Following the study of Rosenzweig (2007), the utility function of migration must account for salaries and amenities available in the arrival and origin destination and the cost of migrating to the arrival destination, in this model I assume that the student can afford the cost of moving, and that the cost of migration is related to the opportunity cost of moving instead of remaining in Bogotá. A set of individual characteristics included in the survey. Some of the amenities included in the questionnaire are (security, infrastructure, access to good schools and hospitals).

A graduate will migrate if the expected utility associated to migrate to one of the three proposed destinations in Colombia is higher than the expected utility of staying in Bogotá.

The utility of migration has the following equation:

$$EU_{i\,migration} = \gamma \ln(w_m) + \delta x_i + \lambda(z_{im}) + \varepsilon_{im}$$

Where a student i decides to migrate to destination m.

The utility of migrating from Bogotá to one of the third selected intermediate cities (m) is described a as a linear and additive separate function of:

$w_m =$ *Salary offered in the arrival destination.*

$x_i =$ *Personal attributes that influence the decision of migration i.e having relatives that have already migrate, how close are the family ties, the self reported risk and loss aversion level*

$z_{im} =$ *Set of amenities available in the arrival destination. (Security, roads, schools, access to good hospitals, chance of commuting)*

$\varepsilon_{im} =$ *Random term known by the student but not for the researcher.*

And the utility of staying in Bogotá is defining as:

$$EU_{i\,Bog} = \gamma\, P_{jobB}\left(\ln w_{Bog}\right) + \delta(x_i) + \lambda(z_{iBog}) + \varepsilon_{iBog} \quad (2)$$

P_{jobB} *= Probability of finding a job in Bogotá*

$wi_{,Bog} =$ *Expected wage in Bogotá.*

x_i = *Personal attributes.*

Z_{iBog} *= Set of amenities available in Bogotá.*

ε_{iBog} *= Random term known by the student but not for the researcher.*

A future graduate will migrate if and only if:

$$EU_{i\,migration} > EU_{i\,Bog} \quad (3)$$

The probability of migration is defined as

$$P_{migration} = \mathrm{P}\left[EU_{i,migration} > EU_{i,Bog}\right] \quad (4)$$

Working with equation (3) and (4),

$$P\left[\varepsilon_{im} - \varepsilon_{iBog}\right] < \gamma[ln(w_{im}) - ln(P_{jobB} * w_{i,Bog})] + (\delta_{imig} - \delta_{Bog})x_i + \lambda(z_{im} - z_{ibog})$$

We observe the probability of migration $\mathrm{P}(\mathrm{migration})$ and the objective is to estimateγ, δ andλ.

Results

The dependent variable of this model is the self-reported probability of migration from Bogotá to Arauca, to Quibdo, or to Riohacha given four different salaries. Each student reports 12 different probabilities of migration, one by each one of the four salaries offered and for each one of the three cities. I treat each probability of migration as a different observation and create one variable for each one of the amenities in origin and in arrival destination; I also include a city fixed effect. .

Usually when the dependent variable is a proportion, the best approach is to use a GLM model (Papke and Wooldridge 1996). Since for this particular dataset, the estimates have very similar values in both OLS and GLM model I took advantage of the OLS estimates, in order to include an estimation of individual fixed effects.

The expected income, the wage difference between Bogotá and arrival destinations, affects the probability of migration of graduates. I did not found a large difference in the estimates of salaries by the type of university, however for this case being a student of a public university increases the probability to migrate to one of the cities.

Considering commuting will decrease the probability of migration of the graduates to these areas, traditionally migrant population of Arauca and Riohacha are commuters who have their live and home in other Colombian city. For university graduates this type of behaviours repeat, then the challenge of the Arauca, Quibdó and Riohacha is how to become attractive enough that future migrants consider living there instead of commuting.

Public goods such as the perception of security and the perception of having good schools in the in arrival destination, motivates graduates to migrate. These determinants together with higher entrance wages could work as future incentives to promote the mobility of human capital to these regions.