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Robust Determinants Of Reservation Wages In Colombia

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ROBUST DETERMINANTS OF RESERVATION WAGES IN COLOMBIA

by

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This thesis, submitted by Thiago Andrade Moellmann Ferro in partial fulfillment of the requirements for the Degree of Master of Science Applied Economics from the University of North Dakota, has been read by the Faculty Advisory Committee under whom the work has been done, and is hereby approved.

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This thesis is being submitted by the appointed advisory committee as having met all of the requirements of the Graduate School at the University of North Dakota and is hereby approved.

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Title Robust Determinants of Reservation Wages in Colombia

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Degree Master of Science in Applied Economics

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Thiago A. M. Ferro
May, 2015

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ABSTRACT

This work analyzes effects of a particular shock, the Colombia earthquake of 1999, on reservation wages. According to the literature, exposure to shocks of this sort at young age should cause impairment of cognitive and non-cognitive skills, which are essential for the development of professional skills that are determinant of the performance in the labor market. This conclusion is not obtained by this research, which finds the earthquake to cause insignificant labor market outcomes. Demonstration of this finding is made through a difference-in-differences method applied to the STEP (Skills Towards Employability and Productivity) dataset, a survey collected by the World Bank as a random experiment in several low income countries.

Furthermore, there are limitations to this finding as we do not observe migration of survey takers over time in the data. In that regard, there is no way to determine whether the people affected by the earthquake continued to live in the location of the event or whether they migrated over time, which may cause misinterpretation of results. By dropping the areas with the highest indices of immigration from the analysis, this research does not find significant effects of the natural disaster on a particular set of skills either.

However, this approach does not eliminate the migration issue, which is a limitation and should be subject for further research.

Lastly, this work identifies a model of reservation wages on a set of STEP skill variables identified through the Bayesian Model Averaging method. As a final result, we are intent on showing a model capable of explaining the labor supply in this particular market.

CHAPTER I.

INTRODUCTION

The earthquake analyzed occurred in the city of Armenia, Colombia on January 25th, 1999. According to the Emerging Events Database (EM-DAT), the number of people affected by it was 1,205,933, including tsunamis caused by the earthquake. This event was chosen as a potential shock that could affect the development of professional skills and the performance of the labor market. This thesis investigates whether that event was a relevant shock and seeks to obtain a set of variables capable of explaining the labor supply as a result of that analysis.

In chapter II, the literature on Health Economics and consequences of early shocks is reviewed. The results found by this thesis bias against those of the existent literature, showing that for individuals at early age there were no significant effects by the natural disaster.

In chapter III, the World Bank's STEP dataset utilized in this analysis is described along with the statistical methods that were applied. As the first analytical stage, the difference-in-differences method was applied to verify whether there were significant effects for the treatment group, the individuals at ages 3 to 5 in 1999 that were living within

a 100-mile radius from the epicenter of the earthquake. Next, the following stage of the analysis is a BMA model selection process, which seeks to explain the relationship between skills and labor market outcomes.

In chapter IV, the diff-in-diff and BMA processes are explained in detail. This chapter focuses on the econometric analysis and demonstration of results thereof. Ultimately, chapter V concludes this work by summarizing the conclusions and proposing content for further research.

CHAPTER II.

LITERATURE REVIEW

According to Ampaabeng and Tan (2013), health is an important determinant of human capital outcomes in developing countries. In that regard, the authors defend that shocks during children's early-age development, such as malnutrition, will cause impaired development of cognitive skills. This paper contributes to the existing literature by analyzing the effects of particular health shock, the 1999 Colombia earthquake, on cognitive and non-cognitive skills gathered by the STEP survey on Colombia.

The Dutch famine of 1944-45 and the Great Famine of China of 1959-61 exemplify cases of malnutrition that have long-term effects on adulthood. The latter is examined by Meng and Qian (2009), whom find that workers that underwent the Great Famine were likely to work less hours and have lower income than other birth cohorts.

Cas et al (2013) analyze the effects of an earthquake and its tsunami on children who lost their parents. The impacts vary across gender and age, showing short-term negative impacts on school attendance and long-term negative impacts on education trajectories. Girls were more likely to get married five years after the earthquake.

When it comes to cognitive development, literature such as Neelsen and Stratmann (2011) shows that one year olds at the time of the Greek Famine of 1941-42 yielded lower likelihood of being literate and had less years of education than individuals that did not experienced the famine. Events such as droughts have also been examined, for instance by Alderman (2006) as in the Zimbabwean case in 1983-84. He finds that the cognitive development can be partially recovered through compensation in nutrition later in the life.

This paper considers an earthquake as a massive shock that provokes not only physical damage, but also psychological distress. Individuals affected by the earthquake are likely to have their lives changed emotionally and financially, which could change the way they supply their labor and determine their reservation wages.

In the analysis, the outcomes differ from other references in this literature review that analyze treatment versus no-treatment. The first prong of this analysis has the treatment group as early age and the control group as older age individuals. In that sense, the focus is on exposure to early shocks, rather than exposure to a more generic sort of shock.

Moreover, unlike existing literature, this paper finds that skills of adults who went through the earthquake distress at young age are not significantly affected by the shock. It then focus its contribution on finding the robust determinants of their reservation wages and testing whether the outcomes are dependent on their cognitive development.

CHAPTER III.

DATA AND METHODOLOGY

This thesis is one of the first works to utilize the STEP (Skills Towards Employability and Productivity) dataset, a survey collected by the World Bank in 2012 and made publicly available in December, 2014. The survey was designed to better understand the correlation between skills and employability. The program collected data from households and employers in several low income countries. We turn our attention to data gathered for Colombia.

STEP measures three types of skills: cognitive skills, the abilities to understand complex ideas, solve abstract problems, adapt to the environment and learn from experience (examples are literacy and numeracy); socio-emotional skills, also referred to as non-cognitive skills, which are related to emotions, personality and behavior; and most importantly, job-relevant skills, which are built from cognitive and non-cognitive skills and are related to specific tasks, such as using a computer.

According to the discussion paper on STEP skill measurement surveys, STEP's goal is to measure human capital stocks, that is, skill supply. The collection of background information is made by randomly selecting a member of a household to answer questions regarding their skill acquisition history, educational attainment, work status and history, family background, and health.

CHAPTER IV.

RESULTS

The evaluation of the effects of the earthquake is made by a diff-in-diff model of a set of cognitive and non-cognitive skills on a dummy for cohorts of age, a dummy for places affected by the earthquake and an interaction term of the two dummies.

$$skill_i = cohort_i + earthquake_i + interaction_i$$

The cohort variable represents people at ages 3 to 5 at the time of the earthquake as the treatment group and people aged from 6 to 8 years old at the time of the earthquake as the control group. The remaining ages are missing values. This variable is responsible for controlling for individuals at young age at the time of the shock, as opposed to more advanced ages. The cohort was chosen according to the data available, which is ages 15 to 64. Because the survey was carried out in 2012, the youngest individuals in the data were aged 3 years old at the time of the event. The theory of psychology was determinant for the age-5 cohort, as this is the age by which most of the child's cognitive skills are

developed. The control group was then defined as the three consecutive years, that is, ages 6 to 8.

The earthquake dummy represents a variable that yields 1 if the individual's reported home is within a 100-mile radius from the city of Armenia, the epicenter of the earthquake; and yields 0 otherwise. The 100-mile radius criterion was chosen by researching the news about the earthquake and its aftermath in different cities. After comparing some of them, the radius was determined and used along with a variable that measures the distance from the survey takers' municipalities to the epicenter in order to generate the treatment group. The interaction variable was generated by multiplying the cohort and earthquake dummies.

Table 1

	(1) m3_q01	(2) m3_q05	(3) m5a_q02	(4) m5a_q26	(5) m5a_q06	(6) m5b_q21	(7) m6a_q0110	(8) m6a_q0111	(9) m6a_q0112
cohort	0.323	0.00247	-0.0890	-0.0391	-0.500	-0.553**	0.128	0.130*	-0.240*
	(1.82)	(0.07)	(-1.46)	(-0.18)	(-1.43)	(-3.24)	(1.10)	(2.11)	(-2.28)
earthquake	-0.342	0.0674	0.146	-0.246	0.154	0.186	0.279	-0.0528	0.192
	(-1.29)	(1.27)	(1.39)	(-0.58)	(0.43)	(0.90)	(1.60)	(-0.57)	(1.22)
interaction	0.195	-0.0764	-0.116	0.706	0.721	0.0802	-0.157	-0.168	0.000796
	(0.47)	(-0.92)	(-0.77)	(1.28)	(1.01)	(0.22)	(-0.58)	(-1.17)	(0.00)
_cons	8.189***	0.107***	0.309***	3.246***	2.500***	3.019***	2.417***	1.357***	3.048***
	(66.69)	(4.33)	(6.73)	(19.12)	(13.24)	(29.18)	(29.85)	(31.80)	(41.77)
N	401	401	259	175	127	212	400	400	400

t statistics in parentheses

* p<0.05, ** p<0.01, *** p<0.001

The dependent variables above are described as: (1) a measure of life satisfaction, (2) is a dummy for whether or not the survey taker has a chronical illness, (3) a dummy for whether or not the individual has worked in the past 12 months, (4) measures the amount of pages they usually write per day at work, (5) measures the amount of pages they usually read at work, (6) is a measure of how useful their education was for their work, (7) is a dummy for whether or not they tend to worry, (8) is a measure of how interested they are in learning new things, and finally, (9) is measure how the survey takers prefer relaxation over work.

As we can see, some coefficients for the earthquake dummy are positive, indicating a direct relationship between development of skills and the natural disaster. These results bias against the existent literature on how early shocks affect individuals' skills. Furthermore, as shown in (1), the event causes a negative impact on overall life satisfaction, in (4) it is shown to be harmful to a skill such as writing, and (8) it depresses their desire to learn new things. However, some results go in unusual directions such as (5), an increase on average in their reading skills.

As mentioned before, the main limitation to the findings of this work is the fact that we cannot assure the residences of the survey takers remain the same over time because we do not observe their residences at the time of the earthquake. We can only observe their hometown at the time the survey was carried out. This limitation is present and acknowledged by this work.

Nevertheless, to try to mitigate the limitations of our findings, the method is repeated after dropping the municipalities that receive the most immigration: Bogota, Cali, Medellin and Barranquilla. These areas were determined according to literature on urbanization and population growth such as Fields (1982) and Schultz (1971). Moreover, there is the issue that dropping these areas diminishes the number of observations in the analysis and likewise our level of confidence in the results. However, the experiment means to curb the migration issues and does not yield significant results either.

Table 2

	(1) m3_q01	(2) m3_q05	(3) m5a_q02	(4) m5a_q26	(5) m5a_q06	(6) m5b_q21	(7) m6a_q0110	(8) m6a_q0111	(9) m6a_q0112
cohort	0.486	0.0231	0.0277	-0.230	-0.152	-0.771**	-0.000261	0.194	-0.385*
	(1.88)	(0.40)	(0.28)	(-0.63)	(-0.25)	(-3.02)	(-0.00)	(1.90)	(-2.51)
earthquake	0.148	-0.0450	0.250	-0.520	0.744	0.352	0.528*	-0.180	0.0496
	(0.45)	(-0.60)	(1.86)	(-0.89)	(1.28)	(1.24)	(2.13)	(-1.38)	(0.25)
interaction	-0.212	-0.103	-0.294	0.980	0.275	-0.0327	-0.237	-0.108	0.480
	(-0.39)	(-0.85)	(-1.43)	(1.23)	(0.25)	(-0.06)	(-0.58)	(-0.51)	(1.49)
_cons	8.292***	0.125**	0.216**	3.520***	2.333***	3.119***	2.352***	1.380***	3.070***
	(49.05)	(3.31)	(2.99)	(12.93)	(7.06)	(20.56)	(18.56)	(20.64)	(30.48)
N	165	165	103	71	56	88	164	164	164

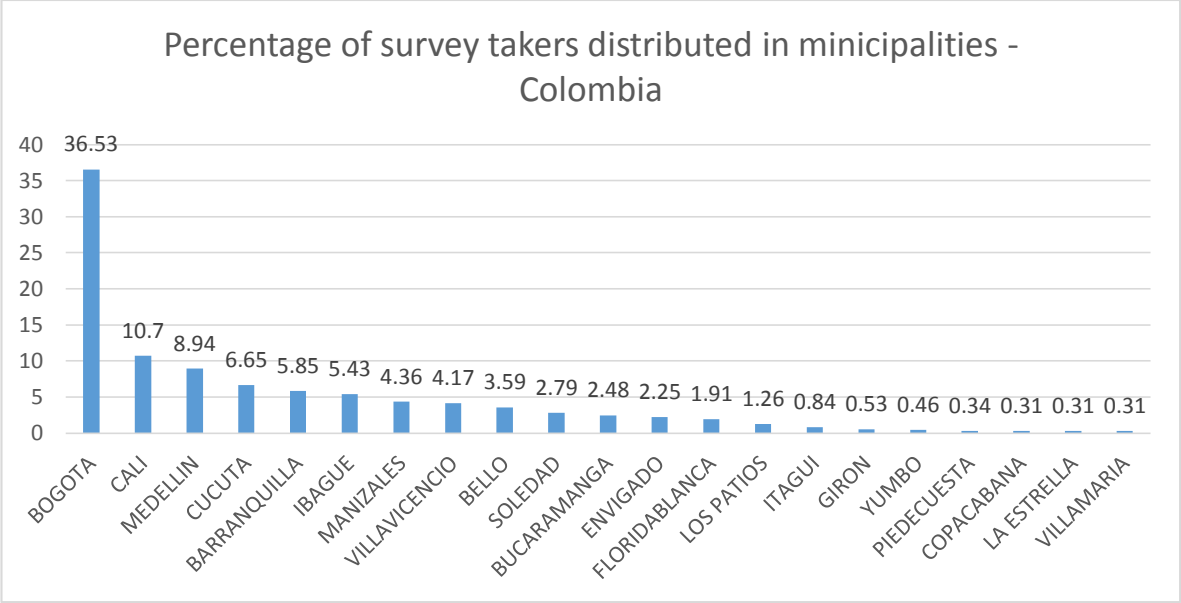
t statistics in parentheses

* p<0.05, ** p<0.01, *** p<0.001

In table 2, the results are produced with immigration areas excluded from the data. As shown above, aside from the constant, most of the coefficients in the nine distinct models of skills on age cohorts and earthquake proximity dummies are not significant at the 5% level.

Colombia is divided into districts, which, by their turn, are divided into municipalities. Those are represented in the graph below, where the distribution of people examined by STEP is graphed.

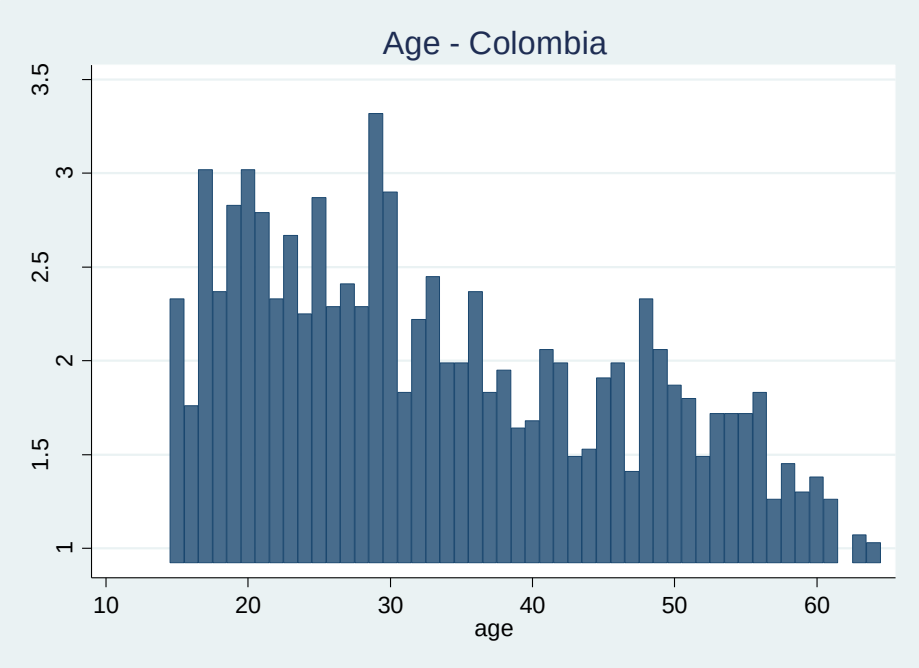
Figure 1



Bogota, Cali, Medellin and Barranquila are the most urbanized areas of Colombia, representing the highest population indices and the largest amounts of people surveyed by STEP. The city of Armenia, where the epicenter of the earthquake occurred, is located in the municipality of Ibague, which represents 5.43% of the people examined by the dataset.

Likewise, it is valuable to illustrate the age distribution of the data. As shown below, the majority of the data are individuals aged 18 to 30 years old, whereas the minority are aged 55 years old and over.

Figure 2



Based on the assumption that there are specific characteristics attached to each municipality, the next step of this research is developing a difference-in-differences model that controls for those idiosyncrasies by adding municipality dummies to the model. The dummy for the Yumbo municipality was randomly excluded from the model to avoid perfect multicolinearity issues:

$$skill_i = cohort_i + dbogota_i + \cdots + dvillavincencio_i + interaction_i$$

The results are also insignificant when the municipality dummies are added. It is important to note that several coefficients for the dummies show up as missing values as they were eliminated due to colinearity issues.

Table 3

	(1) m3_q01	(2) m3_q05	(3) m5a_q02	(4) m5a_q26	(5) m5a_q06	(6) m5b_q21	(7) m6a_q0110	(8) m6a_q0111	(9) m6a_q0112
cohort	0.33	-0.0143	-0.107	-0.0336	-0.391	-0.513**	0.147	0.141*	-0.218*
	-1.83	(-0.41)	(-1.74)	(-0.15)	(-1.08)	(-2.94)	-1.26	-2.25	(-2.03)
dbogota	-1.892	0.109	0.359	0.128	0.633	-0.0564	-0.559	-0.726	-0.969
	(-1.18)	-0.35	-0.81	-0.1	-0.42	(-0.05)	(-0.54)	(-1.31)	(-1.02)
dbarranqui~a	-2.411	0.103	0.22	-0.107	-0.277	0.354	-0.41	-0.502	-0.981
	(-1.48)	-0.32	-0.48	(-0.08)	(-0.17)	-0.32	(-0.39)	(-0.89)	(-1.01)
dbello	-1.856	0.0776	0.0493	0.0665	.	.	-1.492	-0.56	-1.121
	(-1.13)	-0.24	-0.11	-0.05	.	.	(-1.39)	(-0.98)	(-1.14)
dbucaramanga	-2.147	0.00637	0.58	-1.5	2	-0.568	-0.732	-0.618	-1.236
	(-1.28)	-0.02	-1.17	(-0.99)	-1.19	(-0.51)	(-0.67)	(-1.06)	(-1.23)
dcali	-2.739	0.283	0.482	-0.297	0.211	0.0178	-0.416	-0.622	-0.769
	(-1.69)	-0.89	-1.05	(-0.22)	-0.14	-0.02	(-0.40)	(-1.11)	(-0.80)
dcopacabana	-0.83	1.014**	0.107	2	.	.	-2.147	-1.141	-0.282
	(-0.42)	-2.65	-0.2	-1.32	.	.	(-1.69)	(-1.68)	(-0.24)
dcucuta	-1.352	0.159	0.416	0.0787	0.283	0.0969	-0.349	-0.709	-1.13
	(-0.84)	-0.5	-0.92	-0.06	-0.18	-0.09	(-0.33)	(-1.26)	(-1.17)
denvigado	-1.898	0.109	0.192	0.557	3	-0.325	-1.088	-0.184	-1.469
	(-1.14)	-0.33	-0.41	-0.42	-1.42	(-0.27)	(-1.00)	(-0.32)	(-1.47)
dfloridablanca	-2.094	0.29	0.303	0.644	-0.203	-0.122	-0.756	-0.612	-0.652
	(-1.23)	-0.87	-0.62	-0.45	(-0.12)	(-0.10)	(-0.69)	(-1.04)	(-0.64)
dgiron	-0.5	-8.23E-14	.	.	-1	1	1	-0.5	8.61E-13
	(-0.26)	(-0.00)	.	.	(-0.54)	-0.78	-0.79	(-0.74)	0
dibague	-1.549	0.0859	0.208	0.224	1.62	0.877	-0.321	-0.869	-0.759
	(-0.95)	-0.27	-0.45	-0.16	-1.02	-0.8	(-0.30)	(-1.53)	(-0.78)
ditagui	-1.665	0.507	0.553	.	.	1	-1.074	-0.57	-0.891

	(-0.85)	-1.33	-1.03	.	.	-0.67	(-0.85)	(-0.84)	(-0.77)
dlaestrella	-3	-8.26E-14	.	.	.	-1	-2	-1	-2
	(-1.33)	(-0.00)	.	.	.	(-0.67)	(-1.37)	(-1.28)	(-1.49)
dlospatios	-1.29	0.257	0.738	2	-0.244	-0.351	-0.574	-0.57	-0.641
	(-0.76)	-0.78	-1.45	-1.14	(-0.15)	(-0.31)	(-0.52)	(-0.97)	(-0.64)
dmanizales	-1.908	0.0864	0.621	-1.023	0.486	-0.0354	-0.0348	-0.626	-0.811
	(-1.17)	-0.27	-1.36	(-0.73)	-0.31	(-0.03)	(-0.03)	(-1.10)	(-0.83)
dmedellin	-1.741	0.0392	0.294	0.158	0.723	-0.0289	-0.394	-0.584	-0.765
	(-1.08)	-0.12	-0.65	-0.12	-0.45	(-0.03)	(-0.38)	(-1.04)	(-0.79)
dpiedecuesta	-2	-8.26E-14	-3.24E-13	0.966	.	.	.	.	.
	(-0.89)	(-0.00)	(-0.00)	-0.55	.	.	.	.	.
dsoledad	-1.435	0.236	0.343	-0.31	0.391	0.257	-0.595	-0.516	-1.147
	(-0.87)	-0.73	-0.74	(-0.23)	-0.21	-0.23	(-0.56)	(-0.90)	(-1.16)
dvillamaria	-3.00E-13	-8.23E-14	.	1.966	.	.	-1	-1	8.60E-13
	(-0.00)	(-0.00)	.	-1.11	.	.	(-0.69)	(-1.28)	0
dvillavice~o	-1.883	0.00436	0.189	1.318	0.565	0.366	-0.654	-0.651	-0.76
	(-1.16)	-0.01	-0.41	-1	-0.35	-0.33	(-0.62)	(-1.16)	(-0.78)
interaction	0.316	-0.0766	-0.112	1.018	0.6	0.128	-0.185	-0.201	-0.00351
	-0.76	(-0.94)	(-0.73)	-1.83	-0.84	-0.35	(-0.69)	(-1.39)	(-0.01)
_cons	10.00***	8.26E-14	3.24E-13	3.034*	2	3.000**	3.000**	2.000***	4.000***
	-6.29	0	0	-2.41	-1.33	-2.86	-2.91	-3.63	-4.22
N	401	401	259	175	127	212	400	400	400

t statistics in parentheses

* p<0.05, ** p<0.01, *** p<0.001

In Table 4, the model is reproduced without the migration areas. Once again, the research is intent on mitigating the imprecision of results that may occur because the location

of a certain individual in the data over time is unknown. This method reduces the total number of observations from 2,596 to 984.

Table 4

	(1) m3_q01	(2) m3_q05	(3) m5a_q02	(4) m5a_q26	(5) m5a_q06	(6) m5b_q21	(7) m6a_q0110	(8) m6a_q0111	(9) m6a_q0112
cohort	0.447	-0.0295	-0.0025	-0.361	0.324	-0.719**	0.0801	0.208	-0.330*
	-1.63	(-0.51)	(-0.02)	(-1.00)	-0.47	(-2.71)	-0.41	-1.95	(-2.09)
dbello	-1.906	0.0841	0.00115	-0.0974	.	1	-1.463	-0.589	-1.073
	(-1.26)	-0.27	0	(-0.08)	.	-0.73	(-1.37)	(-1.00)	(-1.23)
dbucaramanga	-2.199	0.0131	0.502	-1.5	2	0.491	-0.702	-0.648	-1.187
	(-1.43)	-0.04	-1.05	(-0.99)	-1.07	-0.48	(-0.65)	(-1.08)	(-1.34)
dcopacabana	-0.947	1.029**	0.0025	2	.	.	-2.08	-1.208	-0.17
	(-0.53)	-2.72	0	-1.32	.	.	(-1.63)	(-1.72)	(-0.16)
dcucuta	-1.412	0.167	0.354	-0.0405	0.027	1.19	-0.314	-0.743	-1.072
	(-0.95)	-0.54	-0.8	(-0.03)	-0.02	-1.2	(-0.30)	(-1.29)	(-1.25)
denvigado	-1.968	0.118	0.127	0.417	3	0.813	-1.048	-0.225	-1.402
	(-1.28)	-0.37	-0.28	-0.31	-1.27	-0.72	(-0.97)	(-0.38)	(-1.58)
dfloridabl~a	-2.128	0.294	0.251	0.426	-0.441	0.93	-0.737	-0.631	-0.62
	(-1.37)	-0.9	-0.53	-0.29	(-0.23)	-0.86	(-0.67)	(-1.04)	(-0.69)
dgiron	-0.5	-1.21E-14	.	.	-1	2	1	-0.5	-1.64E-13
	(-0.28)	(-0.00)	.	.	(-0.49)	-1.69	-0.79	(-0.72)	(-0.00)
dibague	-1.455	0.0833	0.237	-0.261	1.604	1.937	-0.235	-0.909	-0.879
	(-0.97)	-0.26	-0.52	(-0.19)	-0.9	-1.91	(-0.22)	(-1.55)	(-1.01)
ditagui	-1.724	0.515	0.501	.	.	2	-1.04	-0.604	-0.835
	(-0.96)	-1.37	-0.96	.	.	-1.47	(-0.82)	(-0.87)	(-0.81)

dlaestrella	-3	-1.20E-14	.	.	.	.	-2	-1	-2
	(-1.46)	(-0.00)	.	.	.	.	(-1.38)	(-1.25)	(-1.68)
dlospatios	-1.349	0.265	0.668	2	-0.53	0.737	-0.54	-0.604	-0.585
	(-0.87)	-0.81	-1.35	-1.15	(-0.29)	-0.71	(-0.49)	(-1.00)	(-0.65)
dmanizales	-1.795	0.0833	0.646	-1.561	0.462	1.056	0.0682	-0.674	-0.955
	(-1.19)	-0.26	-1.46	(-1.07)	-0.26	-1.05	-0.06	(-1.15)	(-1.10)
dpiedecuesta	-2	-1.21E-14	.	0.639	.	.	.	.	.
	(-0.97)	(-0.00)	.	-0.36	.	.	.	.	.
dsoledad	-1.48	0.242	0.301	-0.544	-0.324	1.36	-0.569	-0.541	-1.104
	(-0.98)	-0.76	-0.67	(-0.40)	(-0.15)	-1.3	(-0.53)	(-0.92)	(-1.26)
dvillamaria	3.05E-13	-1.19E-14	2.01E-15	1.639	.	.	-1	-1	-1.62E-13
	0	(-0.00)	0	-0.92	.	.	(-0.69)	(-1.25)	(-0.00)
dvillavice~o	-1.919	0.00896	0.144	1.173	0.446	1.403	-0.633	-0.672	-0.726
	(-1.29)	-0.03	-0.33	-0.89	-0.25	-1.39	(-0.60)	(-1.16)	(-0.84)
interaction	-0.0834	-0.0539	-0.28	1.661*	-0.0432	0.0359	-0.376	-0.147	0.466
	(-0.15)	(-0.46)	(-1.38)	-2.17	(-0.04)	-0.07	(-0.95)	(-0.67)	-1.44
_cons	10.000***	1.21E-14	-1.78E-15	3.361*	2	2.000*	3.000**	2.000***	4.000***
	-6.88	0	(-0.00)	-2.61	-1.2	-2.08	-2.92	-3.53	-4.76
N	165	165	103	71	56	88	164	164	164

t statistics in parentheses
* p<0.05, ** p<0.01, *** p<0.001

Other robustness checks were tried and not exposed. The methodology was replicated for different measures of radii, such as 150 miles. For that case, the outcomes were not significant either.

Following the results above, this thesis finds that the effects of the early shocks on this particular society's skills and labor outcomes were not statistically significant. It is important to point out as one of the main comments, that this research is not aware of policy changes the Colombian government may have made and their consequences to the effects of earthquakes on an individual's recovery from it. Neither was taken into consideration the fact that there may have been policies to promote investment and gather resources for the called-for rebuilding of Colombian cities. In summary, it does not consider remedial interventions there could have happened after 1999.

Next, this work applies Bayesian Model Averaging (BMA) to select a model capable of explaining whether cognitive and non-cognitive skills affect the supply of labor in this market. This method is responsible for finding determinants of reservation wages under model uncertainty. In that regard, the application of this statistical technique is expected to produce posterior inclusion probabilities (PIP) that measure the likelihood of certain covariates to be in the true econometric model.

The BMA output is represented in table 5, where the municipality dummies were taken as certain in the model and 27 STEP survey answers were tested and named in a simplified manner:

Table 5

Variable	Coefficient	t-stat	PIP
_cons	13.31115	23.24	1
dbogota	0.2046273	0.49	1
dbarranquilla	0.108063	0.24	1

dbello	0.2112765	0.42	1
dbucaramanga	0.4097158	0.71	1
dcali	0.169454	0.4	1
dcucuta	0.1723596	0.34	1
dibague	-0.1604157	-0.33	1
ditagui	0.1244689	0.22	1
dlospatios	0.0367575	0.06	1
dmanizales	-0.0679376	-0.15	1
dmedellin	-0.0291248	-0.07	1
dsoledad	-0.0766802	-0.14	1
dvillavicencio	0.595082	1.33	1
k1	0.0146159	0.29	0.12
k4	0.0141954	0.24	0.09
k6	-0.0156232	-0.54	0.28
k7	0.025939	0.28	0.11
k8	0.5491869	1.42	0.75
k9	0.0010087	0.02	0.05
k10	0.0035617	0.11	0.05
k11	0.7253437	2.27	0.91
k14	-0.0001351	-0.05	0.05
k16	-0.0192674	-0.19	0.07
k17	-0.0429772	-0.68	0.38
k18	-0.0029135	-0.25	0.1
k19	-0.0136915	-0.18	0.07
k20	-0.0039702	-0.04	0.05
k21	0.0023119	0.08	0.05
k22	0.0011068	0.06	0.05
k23	-0.0087789	-0.28	0.12
k24	0.0061376	0.25	0.1
k25	0.011642	0.34	0.15
k26	0.0016055	0.09	0.05
k27	-0.0024311	-0.16	0.07

BMA presents high posterior inclusion probabilities for variables k8 (dummy for whether the survey participant owns a car), k11 (dummy for whether they have received government transfers) and k17 (a scale of how well they think they compare with classmates in high grades of primary and secondary school). Because only three

variables tested significant PIPs, BMA suggests that several results obtained using the other variables may not be robust to model uncertainty.

According to literature on BMA methods, Magnus (2011), establishes a 75% PIP as being a good measure of robustness under model uncertainty. As shown above, only two of the twenty-seven variables meet that criterion. However, because k17 differs so much from the otherwise low PIPs of the remaining variables, the 38% PIP was considered by this research, despite not meeting the Magnus (2011) threshold.

In conclusion, the results show that an individual's reservation wage depends on the assets they own; their support from the government; and, their self-perception of qualification among peers.

CHAPTER V.

IMPLICATIONS AND FURTHER RESEARCH

This paper performed a contribution to the literature on the development of professional skills and how they are affected by shocks at early age. As the second prong of it, it analyzed effects of those skills on reservation wages.

In its analysis, the effects of a particular earthquake were insignificant on a set of certain cognitive and non-cognitive skills, which are determinants of employability and productivity. These results were limited by the fact that migration of the earthquake victims is not captured by the data. The difference-in-differences model was reapplied to the dataset once observations related with the largest urban areas that receive the most migrants in the country were dropped. This procedure also observed insignificance of results.

As future research, the methods and robustness checks applied could vary more broadly. The age cohorts were determined by both the limitation that was imposed by the dataset and the psychological point of view of a child having most of their cognition developed by age 6. In this sense, other cohorts as well as other radii could be tried out for exploratory purposes.

This research then sought to obtain a model capable of explaining the variability of reservation wages vis-à-vis the skill-related answers collected by the World Bank STEP survey. The BMA method was applied to a set of questions surveyed and its results indicate that rather than a skill-related supply of labor, the Colombian case is one dependent on: (i) assets such as a

car, (ii) government transfers and (iii) quality evaluation of oneself[1], which are positively correlated with reservation wages. This fact allows for the interpretation that a lot of the skills reported in the survey do not assure robustness under model uncertainty.

Lastly, this research could be improved by means of a more detailed dataset. Questions such as whether the individuals moved elsewhere from birthplace were not included in the data. This information would be critical to better evaluate the effects of the earthquake shock.

[1] This variable is shown as question 45 of module 2 in the STEP survey and ranges from 1 to 9, by order of answers. The first answer being "excellent/among the best in class", followed by ''above average", "average", "below average" and "don't know". Therefore, higher values mean lower self-evaluation, which explains the negative coefficient on this variable. However, this result means positive correlation with the individuals' reservation wages.

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