

DO FORMAL WORKERS USE INFORMAL SEARCH METHODS?
INVESTIGATING LABOR SEARCH IN MEXICO

A Thesis

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by

Zilin Zhong

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ABSTRACT

This study examines how formal sector employment affects the worker's job search methods in Mexico. It studies how each worker and workplace characteristic is associated with the probability of using each job search method as opposed to private/public agencies using a multinomial logit model. It also examines a differential effect of using friends and family search in different sizes of town: the bigger the size of town, the more rewarding is friends and family search in terms of real monthly wages, and the possibility that the position offers any work-related benefits. In addition, it finds that using job search methods such as friends/family search and internet search is associated with a slightly larger probability of that position being in the formal sector for males than females, while using direct approach and advertisement are associated with a significantly larger probability of that position being in the formal sector for females than males.

Importantly, it argues that although searching through friends were associated with larger monetary rewards in smaller sizes of towns, as signaled by the positive interaction variables, they do not outweigh the negative effect on real monthly income of living in smaller towns. Therefore overall, larger towns are associated with larger incomes for workers who use familial search.

BIOGRAPHICAL SKETCH

Zilin (Moir) Zhong is a Master of Science student at the Dyson School of Applied Economics and Management at Cornell University with a focus on International Economics and Development. She received a Bachelor of Arts degree in Economics from Oberlin College. She completed her undergraduate honor thesis about parental educational investment in left-behind children in China. Her interests include international development, labor economics and econometrics.

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1 Introduction

i) Job Search Methods

The choice of job search methods is an important determinant of an individual's living standard and welfare. Job search methods that accurately convey employer and employee information such as employee capability, work-related benefits, employee efforts and work environment could reduce information asymmetry. As a result, they could potentially lead to higher productivity for firms, better job matches, higher incomes and better work environments for workers. The choices of job search methods include searching through friends and relatives, directly approaching employers, seeking employment through public or private job search agencies, or through advertisements on media and online platforms. The first two methods are often addressed as informal job search methods, while the others are addressed as formal job search methods.

Searching jobs through social networks is a common means of job search methods. Many argue that about half of all jobs are filled through personal contacts in major developed economies (Granovetter, 1974; Holzer, 1988; Corcoran, 1980; Topa, 2001, Ioannides & Loury; 2004). Advantages of hiring acquaintances include saved time in interviews, background checks and skill tests, a higher level of trust, a deeper sense of care and commitment, and wage savings (Indeed Career Guide, 2021). In the absence of a well-functioning formal job search mechanism, there potentially exists high search friction between worker skills and employer requirements in the development context, as well as higher signaling costs and low signaling accuracy of the workers' aptitude. In formal firms, where firing and hiring workers could be costly, hiring workers with

references might serve to reduce hiring and firing costs, and reduce losses due to worker-mismatches.

ii) Economic Problem

There have been divergent opinions concerning the effects of informal job search methods on wages and job durations. However, researchers agree that job searching through friends and relatives is often productive. Blau and Robins (1990) found that workers who used this job search method received and accepted more offers per contact than workers who used other methods. Ioannides and Loury (2014) showed that 8.5% of the employed population found job through friends and relatives in the U.S. Pellizzari (2010) argued the percentage of workers who found their current job through personal contacts ranged from around 17% to 42% in the EU. Marmaros and Sacerdote (2002) found large positive correlations between getting help from fraternity/sorority contacts and obtaining high paying jobs. Rosenbaum et al. (1999) discovered that workers who acquired their current job through friends/families enjoyed a wage advantage that increased with age. On the other hand, many have noted that use of informal search methods is negatively correlated with education level (Loury, 2006, Wahba & Zenou, 2005, Weber & Mahringer, 2006, etc.). Elliot (1999) discovered that workers in high-poverty neighborhoods were 88% more likely to use informal job-search methods than those from low-poverty neighborhoods. In terms of long-term effects, Simon and Warner (1992), Staiger (1990) and Corcoran et al. (1980) observed that this initial wage advantage declined over time. Some even observed no initial or long-term earning effects (Bridges & Villemez, 1986, Holzer, 1987, Marsden & Hurlbert, 1988).

In Mexico, 55.17% of workers reported finding their current jobs through friends and relatives. There is much discrepancy in whether familial search results in higher or lower wages and tenure in developing countries. Garcia and Nicodemo (2013) found that 48% of workers with

tertiary education, and 71% with primary or secondary education preferred the informal search methods in Colombia. Tumen (2015) found in a study in Turkey that in environments with greater cost heterogeneity (greater differences in costs of maintaining social relations), informal search methods tend to yield higher wages than formal search methods, while in environments with stronger peer effects (social forces diffusing faster into individual decision making) the opposite statement tends to be true. Zenou & Wahba (2004), in a study based in Egypt, showed that conditional on being employed, the probability of finding a job through social networks, relative to other search methods, increased and was concave with the size of the network. The effects were stronger for the less educated.

In all papers related to this research, there is agreement that informal workers receive on average fewer years of education, are younger in age, are less likely to be married, and are more likely to be female. Many have found a wage gap between the informal and formal sectors and try to explain it with various methods and survey data. Bargains and Kwenda (2014) found an informal wage penalty of 62% in South Africa, 19.5% in Mexico, and 11.5% in Brazil. Conover, Khamis and Pearlman (2021) found an informal wage penalty of 2.6 pesos in hourly wages among workers with primary and secondary education, and 9.78 pesos among workers with upper secondary and college education. Besley and Burgess (2004) argued that labor regulations, which separated the formal from the informal, resulted in less flexibility in firms' hiring and firing, therefore decreased output and exacerbated urban poverty. Because of the characteristics of high-paying, and more rigid hiring and firing processes in the formal sector, this paper expects formal workers to more likely have employed formal search methods such as private agencies, advertisements or online searches, which would require both references and other proofs of qualification, while informal workers would be more likely to have employed searching through

friends or seeking out employers at the workplace (factory, shop or workshop), to quickly and effectively signal qualification. The results agree with ex ante expectations.

iii) Research Problem

Overall, few have measured the productivity of friends and relative search in terms of entrance into the formal or informal sector. A worker is said to be formally employed if they are employed in firms registered as formal enterprises through government organizations, and financially contribute to the Mexican tax and regulatory systems such as IMSS, the Mexican Social Security Institute, ISSSTE, Institute for Social Security and Services for State Workers, and other policies and organizations. Rivas (2019) examined if severance payments, government programs or family remittances in conjunction with the job search channel used had an impact on the probability of exiting unemployment into the formal or informal sector. This paper aims to connect the literature on job search through family and friends with the literature on self-selections into the formal sector. It accomplishes this objective by measuring how formal employment is associated with each job search strategies, in conjunction with a discussion concerning whether the choice of job search methods affects formal sector employment differentially across gender. The difference of job search strategies employed by formal and informal workers is by no means only informative in the development context. However, it is especially interesting to study this link in Latin America, where the share of informal workers is high. This paper focuses on employed workers between 15 and 65 years old, defined by the legal working age in Mexico, with or without salary, and it seeks to measure if formal workers are more likely to have acquired their current jobs through friends and relatives in comparison to informal workers, and if this job search method pays off in terms of wage, work related benefits and work hours.

In addition, this paper discusses the differential effect of using each job search method on formal employment across gender. There exists ample literature concerning the differential effect of job search methods on job outcomes across gender, and even more abundant literature surmising the factors contributing to those differences. For example, Livingston (2006) studied the job searching process and employment outcomes among Mexican immigrants in the United States. She found that women who used network-based job searches were less likely to obtain formal sector employment than women who found work without network assistance. As of the reasons to why the gender wage gap persisted, Cortés, Pan, Pilossoph and Zafar (2021) presented empirical evidence for the gender difference between timing of job offer acceptance, with women displaying higher risk aversion and accepting the job offers earlier. They concluded that the difference in risk aversion contributed to most of the gender wage gap. Using French administrative data on job search criteria, Barbanchon, Rathelot and Roulet (2020) posited that 14% of the gender wage gap was driven by a higher perceived cost of commuting by female workers relative to their male counterparts.

The rest of the paper is organized as follows: section 2 describes the dataset used and presents the summary statistics describing different compositions of worker and workplace characteristics of formal workers and informal workers averaged from year 2009 to year 2019. Section 3 (i) describes a multinomial logit model, with the dependent variable being the choice of each search method as opposed to the base category: searching through private/public agencies. The independent variables are chosen to be worker and workplace characteristics such as gender, age, years of education, years worked in current positions, union membership, and control variable such as year, state, urban/rural, and size of town. In section 3 (ii), interaction variables are included to see whether familial search has differential effects across sizes of town

on workers' real monthly income, hours worked per week, years stayed in current jobs, and whether they received any form of work benefits, including fixed effects on the municipalities that individual workers inhabited with robust standard errors. Section 3 (iii) describes the association between use of job search methods for workers' current positions and the probability that the workers' current positions are in the formal sector for the female and male subsections of the sample separately. Section 4 discusses the results in conjunction with possible flaws, extensions and applications of this study.

2 Data

i) Data Source

This paper used the ENOE (National Survey of Occupation and Employment) in Mexico from year 2009 to 2019. In each quarter of each year starting from 2009, the surveyors randomly selected from all Basic Geostatistical Areas devised using the standard geostatistical procedure¹, and randomly selected 5 dwellings from each of the selected areas. For all workers in the selected dwellings, it reported information concerning labor market participation, labor market performance, job search duration and methods, as well as demographic information such as age and gender. It adopted a rotating panel format, in which it divided all sampled populations into 5 panels and replaced each panel (20% of all surveyed dwellings) with newly sampled population every quarter. Quarterly datasets that were 5 quarters apart consisted of entirely differently sampled populations. In addition, the dataset was divided into basic questionnaires and extended questionnaires, where the basic version was distributed in the first quarter of all years, covering more questions than the extended version, which was distributed in all three remaining quarters of all years. The basic questionnaires contained information about the sampled populations' job search methods selected for the current jobs, while the extended questionnaires did not. Therefore, this paper used only the first quarters of all years. Because of the random sampling

¹ The Geostatistical Framework is a unique and national system designed by the INEGI (Mexican National Institute of Statistics and Geography), which presents the division of the national territory into different levels of disaggregation to refer geographically the statistical information of the institutional censuses and surveys. Basic Geostatistical Areas are the basic units of the Geostatistical Framework.

techniques and the statistical structure employed by the survey, this paper assumed that no extra weight was given to a certain proportion of the sample due to endogenous factors.

ii) Portion of the Data Source Used for Analysis

In Mexico, the minimum legal working age was 15 years old, and the legal retirement age for Mexico is 65 years old. This study restricted its attention to workers who were between 15 and 65 years old. In addition, it studied workers who were salaried workers who received salary instead of other forms of compensation such as work benefits, food stamps, shelter or food. Workers who founded their own companies, and workers who were self-employed were excluded to eliminate the heterogeneous effects of formal and informal sector on the search methods of workers with different kinds of employment and pay methods. Importantly, workers who were unemployed were excluded from the sample. Employed workers who were employed on a full-time basis or were paid and absent with work nexus (planning to return to work positions in the future) were retained in the sample. Workers who received an income of 0 were excluded from the sample due to the use of logged income in this project.

iii) Variables Selected for Analysis

In this dataset, formal workers were those who reported to have access to medical care through IMSS, the Mexican Institute of Social Security, ISSSTE, the Institute for Social Security Services for State Workers, the navel, military hospital or clinic, or municipal branches of ISSSTE such as ISSSTELEÓN or ISSEMYM. This paper adopted this criterion to identify formal workers because the most essential feature of formal employment is access to medical care. In addition, the survey inquired about the means through which workers found their current jobs, and the answer fell under 6 mutually exclusive and exhaustive categories: through directly

approaching employers in the workplace (factory, shop or workshop), through asking a friend, relative or acquaintance, by means of an advertisement in the public space or in the media (newspaper, radio), through going to an agency or a private job bank or attending a public job placement service, through the internet, or through other means (a temporary government employment program, joining a union or a guild, being directly offered a job, or others).

This study included control variables concerning worker's personal attributes such as gender, years of education received before the interview, number of children in the worker's household, worker's marital status, state, municipality, and the size of town that the worker resided in at the time they were surveyed. It also included variables describing worker's work environment and job characteristics such as real monthly income (translated to year 2009 value), the number of hours that the worker worked per week, the year in which the worker first started their current job, the number of people working at the worker's current firm, industry of the worker's current firm, and whether the worker's current job offered work benefits including profit sharing, life insurance, personal loan, maternity or paternity leave, personal insurance, retirement pension, or vacation with pay. Real monthly income is measured in the unit of pesos in the data section for more easily interpretable presentation. It is measured in the unit of thousands of pesos in all models used in the methodology section to scale down the large variation associated with this variable.

iv) Bivariate Relationships

Below is the kernel density plot of years of education for formal workers and informal workers separately. There are clusters around 6 years, 9 years, 12 years, 16 or 17 years, which correspond to the duration of primary school, middle school, high school, 4-year college and postgraduate institutions in Mexico. The density for formal workers was higher at higher years of

education compared to informal workers, which suggests that education level was higher for formal workers. Figure 2 is the kernel density of monthly income distributions for formal and informal workers. Workers who were unpaid and who were paid more than 15,000 pesos per month are excluded from this figure. Unlike education, real income formed a bell-shaped curve skewed to the right. All income related parameters were adjusted by Mexican inflation rates from 2009 to 2019.

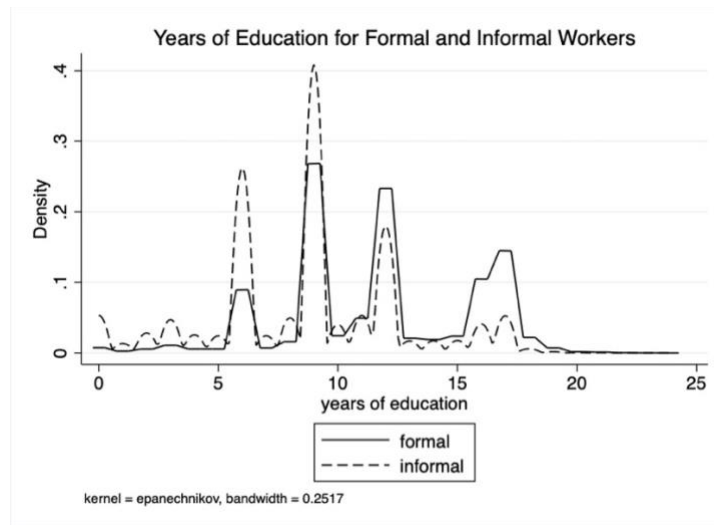


Figure 1 Epanechnikov Kernel of Years of Education for Both Sectors

As one can see, the distribution of monthly income for formal workers is to the right of that for informal workers, suggesting that formal workers tended to have a higher monthly income than informal workers, although the two distributions converge at the right tail, suggesting that workers who received a monthly income higher than 15,000 pesos were similarly likely to work in formal or informal sectors.

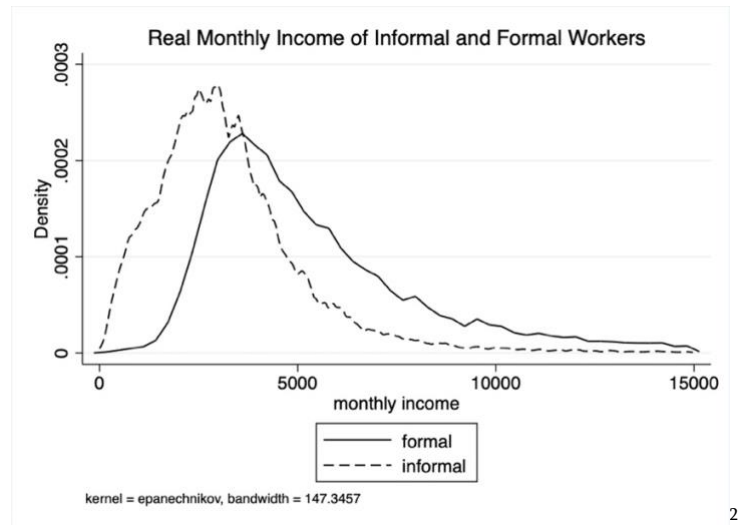


Figure 2 Epanechnikov Kernel of Real Monthly Income (2005 Value) of Both Sectors

² The right tails of real monthly income kernel densities of informal workers and formal workers converge as real monthly income increases to higher levels. This would suggest that at very high levels of real monthly income, not controlling for exogenous factors, each worker was equally likely to be employed in the formal or informal sector. Conover, Khamis and Pearlman (2020) showed that transitioning out of formal salaried work into self-employment resulted in positive changes in wages across all education levels, while transitioning out of formal salaried work into informal salaried work resulted in negative changes in wages across all education levels, using 2005 to 2017 ENOE data. The author argues that one reason for this convergence of right tails is the pervasive distribution of extremely high paying jobs in the formal salaried sector and the self-employment sector.

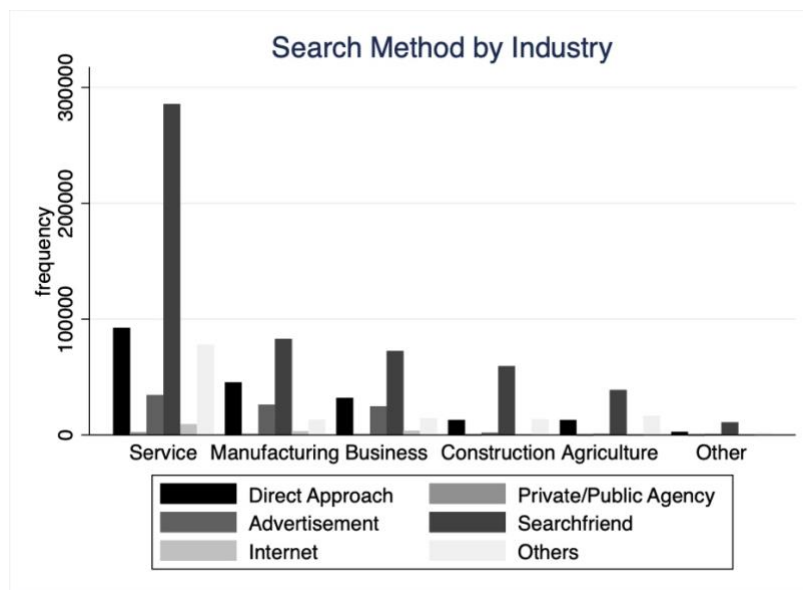


Figure 3 Histogram of Job Search Method Usage Frequency by Industry

Figure 3 is a histogram of the frequency of workers who employed each job search methods in the 6 available categories for industry. Workers who used familial search were mainly situated in the service industry. Familial search was also the most frequently used search means in all industries listed above. The number of workers who employed public or private agencies was very scarce, almost invisible in the graph. Similarly, workers who employed internet search was also scarce, although most notably observed in the service sector. Workers who employed advertisements were mostly distributed in manufacturing, business and service industries. So was the case for workers who employed the direct approach method.

As one can see from Table I, the mean of years of education for formal workers was approximately 3 years longer than informal workers. This agrees with many authors (Conover, Khamis and Pearlman, 2022) that formal workers on average received more education than informal workers. There wasn't noticeable difference between the gender ratio in the formal and informal sector. However, in both sectors, the proportion of workers who were male were approximately 22% higher than female workers. A significantly higher portion of formal workers

were married compared to informal workers. On the other hand, the average number of children was slightly higher for informal workers compared to formal workers.

Table 1 Demographic Summary

Variable	Category	Formal		Informal	
		Mean (SD)	N=	Mean (SD)	N=
Age (years)		36.554 (11.158)	544,006	34.062 (12.747)	464,341
Education (years)		11.621 (3.923)	543,424	8.680 (3.924)	463,633
Number of children		1.604 (1.434)	214,097	1.936 (1.894)	178,937
Gender		Count (%)		Count (%)	
			544,006		464,341
	Male	60.6		61.5	
	Female	39.4		38.5	
Married			544,006		464,341
	Married	49.3		35.1	
	Unmarried	50.7		64.9	

*Education refers to years of education each worker has received until the survey. The differences in number of observations for each worker characteristic is due to missing values for each variable.

Table 2 reports the work-related characteristics of informal and formal workers. Hours worked per week were slightly longer for formal workers than informal workers. Average real monthly income for formal workers was significantly larger than income for informal workers, for a difference of more than 2 thousand pesos. Additionally, formal workers were also more likely to be union members. 78.7% of informal workers were employed in small firms (firms that employed no more than 10 employees), while 56% of formal workers were employed in big firms (firms that employed more than 50 employees). More formal workers were employed in medium sized firms than informal workers. Similar to findings by Cano-Urbina et al. (2016), formal workers on average were more likely to receive work-related benefits such as work bonus (95.3% compared to 25.2%) and maternity/paternity leave (24.2% compared to 0.8%).

Table 2 Workplace Characteristics Summary

Variable	Category	Formal		Informal	
		Mean (SD)	N=	Mean (SD)	N=
Hours worked/week		44.305 (15.332)	544,006	41.062 (18.698)	464,341
Monthly income		5963.83 (4735.271)	544,006	3387.279 (3012.568)	464,341
Union		Count (%)		Count (%)	
	Union	26.5	544,006	1.5	464,341
	Not union	73.5		98.5	
Firm size			515,120		449,497
	Small firm (1-10)	15.5		78.7	
	Medium firm (11-50)	28.5		12.7	
	Big firm (>50)	56.0		8.60	
Work Benefits					
Bonus			544,006		464,341
	Bonus	95.3		25.2	
	No Bonus	4.7		74.8	
Maternity/Paternity Leave			544,006		464,341
	Maternity/Paternity Leave	24.2		0.80	
	No Leave	75.8		99.2	

*Firm Size refers to firm sizes. Hours/week refers to the mean hours worked per week for workers. Each statistics reported are the proportion that falls into each category for each search method. Income refers to real monthly income in terms of thousands of pesos discounted to 2009 value.

3 Methodology and Results

i) Multinomial Logit Model

This section describes the results of the multinomial logit model, with the dependent variable being the choice of job search methods for workers' current position, and the independent variables being worker and workplace characteristics. Table 3 looks at the worker characteristics who used each search method to find their current jobs. The multinomial logit model employed the maximum likelihood estimation, instead of the Ordinary Least Square method conventionally used. It iteratively adjusted the parameters of each variable so that the data supplied was the most likely to be observed.

$$\ln \left(\frac{P(f_{it} = m)}{P(f_{it} = 2)} \right) = \alpha + \sum_{k=1}^K \beta_{mk} X_{ikt} + \varepsilon_{it}, m \in (1,3,4,5,6)$$

For each coefficient β_{mk} , as reported in Table A1, one unit increase in the independent variable X_{ikt} increased the logged probability that each observation fell into category m as opposed to the base category 2 for individual i in year t. Category 2, searching through private or public agencies, was chosen as the base category, as conventionally done in the literature studying job search methods in Mexico.

Table 3 Worker characteristics of job search methods: multinomial logit (relative risk ratio)

	Relative to public/private agency [base]				
	(1)	(3)	(4)	(5)	(6)
	Direct approach	Search Friend	Advertisement	Internet	Others
Formal	0.507*** (0.026)	0.325*** (0.016)	1.014 (0.052)	1.213*** (0.068)	0.200*** (0.010)
Age	1.004** (0.002)	1.001 (0.002)	0.998 (0.002)	0.983*** (0.002)	1.014*** (0.002)
Education	0.901*** (0.004)	0.893*** (0.004)	0.894*** (0.005)	1.172*** (0.007)	0.945*** (0.005)
Male	1.238*** (0.040)	1.277*** (0.041)	1.065* (0.035)	1.296*** (0.047)	1.114*** (0.037)

Married		0.993 (0.034)	1.060* (0.036)	1.075** (0.038)	1.212*** (0.047)	1.044 (0.036)
Monthly income		0.975*** (0.003)	0.982*** (0.003)	0.950*** (0.003)	1.015*** (0.003)	1.008** (0.003)
Union		1.378*** (0.062)	1.302*** (0.058)	1.008 (0.046)	0.690*** (0.036)	2.678*** (0.122)
Urban		0.934 (0.046)	0.908** (0.044)	0.911* (0.045)	0.875** (0.048)	1.121** (0.055)
Industry Base: service						
	Manufacturing	0.160*** (0.050)	0.760*** (0.033)	1.430*** (0.063)	0.970 (0.048)	0.651*** (0.029)
	Business	1.025 (0.045)	0.673*** (0.030)	1.672*** (0.074)	1.102** (0.054)	0.608*** (0.027)
	Construction	1.707*** (0.160)	1.885*** (0.176)	0.664*** (0.064)	1.160 (0.119)	1.793*** (0.169)
	Agriculture	1.689*** (0.250)	1.342** (0.198)	0.565*** (0.085)	0.612*** (0.114)	1.860*** (0.275)
Firm Size Base: small						
	Medium	0.969 (0.050)	0.642*** (0.033)	1.011 (0.053)	1.037 (0.059)	0.454*** (0.024)
	Large	0.909 (0.045)	0.520*** (0.026)	0.930 (0.047)	0.808*** (0.045)	0.258*** (0.013)
(Constant)		146.752*** (20.816)	773.479*** (109.084)	41.554*** (6.019)	0.244*** (0.041)	77.539*** (11.090)
Years worked	Yes	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes	Yes
State	Yes	Yes	Yes	Yes	Yes	Yes
Size of town	Yes	Yes	Yes	Yes	Yes	Yes
N		953,019	953,019	953,019	953,019	953,019
Pseudo R ²		0.0974	0.0974	0.0974	0.0974	0.0974

*The 'others' category for industries was included in the probit model but excluded from this table due to ambiguous description and difficulty in interpretation. The 'others' category for search methods refer to either searching through a union or guild, through a temporary government employment program (federal, state and/or municipal), being simply offered a job, or through other means. The base category for industry is the service industry, and the base category for firm size is small firms (with 0 to 10 employees)

For comparison, the multinomial logit coefficients are listed in Table A1 in the Appendix. Each relative risk ratio coefficient can be represented as:

$$RRR = \frac{P(f_{it} = m|X_{it} + 1)/P(f_{it} = 2|X_{it} + 1)}{P(f_{it} = m|X_{it})/P(f_{it} = 2|X_{it})}$$

Relative Risk Ratios reported in Table 3 are the probability that each observation fell in category m as opposed to the base category after a one unit increase in X_{it} divided by the probability that it fell in category m as opposed to 2 before the increase. As observed in Table 3, being employed in the formal sector adversely affected the logged probability of using informal search methods: direct approach and familial search as opposed to the base category, while it positively affected the logged probability of using formal search methods: searching through internet and advertisements as opposed to using public/private agencies. The ratio of probability of choosing Internet search versus the base category associated with one additional year of education was 1.172:1, while this ratio was less than one for all other job search methods, suggesting that workers with higher education were more likely to have found their current jobs through the internet than other search methods. Living in an urban area adversely affect the logged probability of using any other search methods (excluding the ‘others’ category) compared to the base category, suggesting that living in an urban area increased the probability of using private/public agencies more than any other search methods. Interestingly, male workers were more likely to choose all 5 search methods as opposed to the base categories compared to female workers.

The probability ratio of choosing direct approach as opposed to private/public agency was 1.378:1 between union workers and non-union workers, and that for familial search as opposed to the base category was 1.302:1. This suggested that union workers were more likely to choose the direct approach or familial search as opposed to private/public agencies. Real monthly income had a statistically significant but small effect on job search means. Only workers who used internet search were associated with a larger than 1 probability ratio with a

marginal unit increase in real income as opposed to the base category. Almost all industry coefficients were significant, suggesting that there existed a clear and distinct pattern for choice of job search means across different industries.

In the multinomial logit model, the results suggested that familial search was negatively correlated with formal sector employment. Even after controlling for exogenous factors such as geographical area, industry, firm size, year, education received and marital status, the significance of this effect prevailed. If the rewards for using familial search was not demonstrated in enrollment in the formal sector, it becomes curious what incentivized workers to use the familial search method in terms of job outcomes, or if its usage simply signaled lack of efforts in job search, or the lack of options in the workers' local areas for their targeted job positions. Section (ii) examines the effect of using familial search in terms of some of the most commonly considered job outcomes such as work-related benefits, years worked in jobs found, and real monthly wages.

ii) Job Performance when Using Familial Search in Informal and Formal Sectors

It appears that when the desired job is in the formal sector, workers were less likely to employ the familial search method. One might also be interested in knowing if searching through friends is rewarding in terms of quality of work environment and salary. This section explores if workers who searched through friends received higher real monthly salary, higher probability to have any kind of work benefit, more years stayed in current jobs, or shorter work hours per week. All models included municipality-level fixed effects.

Some argue that larger living areas provide higher potentials for employment opportunities secured through social networks (Zenou & Wahba, 2004). In areas where local markets were not well-integrated, the size of the town might determine the scales of returns to

expanding one's social network. The ENOE survey provided a size of town measure, which was a categorical variable with 4 values: less than 2,500 inhabitants, from 2,500 to 14,999 inhabitants, from 15,000 to 99,999 inhabitants, and more than 100,000 inhabitants. If each new connection made has on average more connections due to the size of the town, then the returns in terms of work opportunities discovered could be bigger for workers in bigger towns than workers in smaller towns for each marginal increase in connections.

The equation estimated is described in equation (3)

$$Y_{it} = X'_{it}\beta_1 + \beta_2 s_{it} * w_{it} + \beta_3 s_{it} * f_{it} + \varepsilon_{1it} \quad (3)$$

In (3), w_{it} is the size of town that worker 'i' resides in year 't', s_{it} is an indicator variable measuring whether worker 'i' was employed in the formal sector in year 't'. f_{it} is an indicator variable measuring whether the worker chose searching through friends and relatives for the employment reported in year 't'. X'_{it} is a matrix of control variables such as age, education, and industry. Y_{it} is work environment and compensation measurements which include: years worked measured by number of years in the current job, monthly income in adjusted by inflation to 2009 value, whether workers received benefits, and number of hours worked each week. Benefit is an indicator variable set to 1 if the worker had one of the following: bonus, vacation with pay, profit sharing, home loan option, day care service access, maternity or paternity leave, retirement fund, life insurance, personal insurance or personal loan. Hours/week is hours worked per week in the past year reported by the worker.

Table 4 Effect of Familial Search on Work Environment and Pay (municipality effect)

	(1) Years worked	(2) Monthly income	(3) Benefit	(4) Hours/week
Searchfriend	0.407*** (0.042)	0.070*** (0.022)	-0.015 (0.011)	-0.043 (0.115)

Formal		0.911*** (0.047)	0.276*** (0.029)	1.908*** (0.013)	1.936*** (0.117)
Searchfriend*		-0.296*** (0.048)	-0.014 (0.030)	-0.049*** (0.015)	-0.304*** (0.117)
Formal					
Size of town ³					
[base: >100,000]					
	<2,500	-0.284*** (0.081)	-0.412*** (0.045)	-0.148*** (0.018)	-1.896*** (0.207)
	2,500-14,999	0.041 (0.080)	-0.363*** (0.046)	-0.108*** (0.018)	-0.945*** (0.185)
	15,000-99,999	0.062 (0.073)	-0.328*** (0.043)	0.003 (0.017)	0.017 (0.177)
Searchfriend*					
size of town					
	Searchfriend*	0.325*** (0.079)	0.160*** (0.031)	-0.008 (0.018)	1.317*** (0.176)
	<2,500				
	Searchfriend*	-0.029 (0.078)	0.102*** (0.036)	-0.018 (0.019)	0.732*** (0.169)
	2,500-14,999				
	Searchfriend*	-0.183*** (0.066)	0.140*** (0.037)	-0.035* (0.018)	0.121 (0.159)
	15,000-99,999				
(Constant)		-5.865*** (0.153)	-1.952*** (0.096)	-1.122*** (0.029)	37.636*** (0.338)
Years Worked	No		Yes	Yes	Yes
Monthly income	Yes		No	Yes	Yes
Benefit	Yes		Yes	No	Yes
Hours/week	Yes		Yes	Yes	No
N		953,019	953,019	953,019	953,019
R ²		0.331	0.240		0.132
F-statistics				1622.11	
p-value				0.0000	

All models included municipality fixed effects, and controlled for age, education, gender, marital status, industry, union membership, firm size, urban/rural, entity and year. The comparison group for size of town is towns with more than 100,000 population. F-statistics and p-value were reported for the probit model since it was the only statistics available in

³ According to the reported coefficients, workers who resided in towns with under 2,500 population sizes earned on average 412 pesos less per month than workers who resided in towns with over 100,000 population. In today's exchange rate, this is equivalent to \$21.424, while in 2009 exchange rate, this was equivalent to \$30.239. This difference reduces to \$26.642 in 2009 exchange rate between towns with sizes between 2,500 and 14,999 and the base category. The difference reduces further down to \$24.073 at 2009 exchange rate between towns with population sizes from 15,000 to 99,999 and the base category. The reader might notice that these differences seem small, considering the differences in purchasing power and price levels for towns of such different population sizes in Mexico. One reason for this might be the heavy representation of service workers in the sample, due to the booming service industry in Mexico. This paper does not rule out the possibility that these small coefficients suggest that living standards are higher in towns of smaller population sizes.

panel setting concerning explanatory power performance. Income measure used for the probit regression is logged real monthly income in order to decrease variance and achieve convergence.

Table 4 reports results of OLS estimation employed for model (1), (2), and (4), as well as results of probit estimation employed for model (3). The results showed some interesting insights into the familial search method. As shown in Table 4 (1), workers who found their current jobs through friends, relatives and acquaintances on average worked 0.407 years more than workers who searched through other means. From (2), we learned that they earned on average 70 pesos more per month than workers who searched through other methods. As indicated by (3) and (4), workers who used familial search were not significantly more likely to receive work benefits or work different hours than workers who did not.

These models showed notable effects of formal employment on job outcomes. Supported by summary statistics in Table 2, formal workers on average stayed in their current jobs for longer than informal workers and earned on average 276 pesos more per month compared to informal workers (Table 4 (2)). They were also significantly more likely to receive work benefits, and likely to work longer hours (1.936 hours). Taking into consideration the interaction effects, formal workers who searched through friends on average stayed 0.615 more years than informal workers who searched through friends. They earned on average 262 pesos more monthly than informal workers who searched through friends, though the interaction term was not significant. Formal workers were significantly more likely to receive any form of work benefits.

Table 4 models also controlled for size of town, which had a negative and significant effect on years worked in current jobs only when comparing towns with less than 2,500 people and towns which had more than 100,000 people; in another word, workers in towns smaller than

2,500 people worked 0.284 years less in their current jobs than workers in towns larger than 100,000, holding all else constant. In comparison, size of town affected monthly income significantly. Smaller towns were associated with lower monthly income. Workers in towns with less than 2,500 people earned on average 412 pesos each month less than workers in towns with more than 100,000 people (the base category), while this difference dwindled to 363 pesos for workers in towns with 2,500 to 14,999 people, and further decreased to 328 pesos for workers in towns with 15,000 to 99,999 people. Decreasing sizes of town also negatively affected the probability of having any form of worker benefits. Workers who live in towns with population less than 2,500 were less likely to have any form of worker benefits than workers who live in towns with more than 100,000. In return, workers who live in smaller towns were also prone to work less hours per week.

Workers used familial search in towns with smaller than 2,500 population earned on average 252 pesos less monthly than workers who used familial search in towns with populations larger than 100,000, and on average stayed for 0.041 more years in their current jobs. Although the interaction term between familial search and living in towns with population less than 2,500 was positive for regression on monthly wages, it did not outweigh the disadvantages of living in smaller towns. Workers who used familial search in towns with 2,500 to 14,999 population earned on average 261 pesos less monthly than the base category and stayed for on average 0.012 more years. Workers used familial search in towns with 15,000 to 99,999 population earned on average 188 pesos less monthly than workers in the base category and stayed for on average 0.121 fewer years. It seems that workers who used familial search for their current positions consistently earned less in terms of monthly wages as the size of town decreased and stayed shorter in their current position as the size of town decreased. It is noteworthy that the

interaction terms between the monetary rewards of searching through friends and relatives with all comparison categories of the size of town was positive compared to the base category with more than 100,000 population. This is congruent with the empirical findings of other papers concerning network and job search methods, as increasing the size of town (or size of network) increases the information passed on through the network, therefore increasing positive returns to using social networks as a job search method. This positive return was also observed for job benefits. Decreasing the size of town was observed to be associated with a decreased probability of finding a job through friends that offered any sort of job benefits such as vacation with pay, maternity or paternity leave, or personal loan, as the size of town coefficients were negative, and the interaction terms were statistically insignificant.

However, increasing sizes of social network, as proxied by the sizes of town that workers resided in, seem to be correlated with fewer years worked in each position. This can potentially be explained by the lack of substitute job opportunities in smaller towns, as workers would not switch job frequently if there existed fewer alternative positions.

iii) The Effect of Gender on Job Search Strategies and Formal Employment.

As seen in the multinomial logit model, coefficients reported in Table 3 above, being female was associated with less probability of choosing friends/family search, direct approach, advertisements, internet, or other methods, as opposed to private/public agencies. Measuring formal employment as a job outcome, this section describes the differences in effectiveness in using different job search methods to attain formal employment across gender. The “Male” columns described coefficients for regressions obtained from the male subsection of the sample, while the “Female” columns described coefficients for only the female subsection of the sample. Table 8 lists the coefficients. All coefficients were statistically significant at 1% level due to

increased statistical power of a big sample. As shown below, searching through friends and relatives for their current jobs was negatively correlated with the possibility of workers' current jobs being in the formal sector. This coefficient was negative and of larger magnitude for female workers than male workers, suggesting that searching through friends/relatives were more actively used for informal jobs for female workers compared to male workers.

Table 5 Effect of Job Search Methods on Formal Employment Across Gender

Search friend	Male -0.178 *** (0.007)	Female -0.237 *** (0.009)						
Direct			Male 0.172 *** (0.009)	Female 0.241 *** (0.011)				
Advertisement					Male 0.538 *** (0.015)	Female 0.543 *** (0.015)		
Internet							Male 0.658 *** (0.034)	Female 0.506 *** (0.037)
Age	0.066 *** (0.002)	0.068 *** (0.002)	0.066 *** (0.002)	0.068 *** (0.002)	0.066 *** (0.002)	0.067 *** (0.002)	0.066 *** (0.002)	0.067 *** (0.002)
Age squared	-0.001 *** (0.000)	-0.001 *** (0.000)	-0.001 *** (0.000)	-0.001 *** (0.000)	-0.001 *** (0.000)	-0.001 *** (0.000)	-0.001 *** (0.000)	-0.001 *** (0.000)
Married	0.224 *** (0.008)	-0.050 *** (0.010)	0.223 *** (0.008)	-0.050 *** (0.010)	0.222 *** (0.008)	-0.050 *** (0.010)	0.224 *** (0.008)	-0.054 *** (0.010)
Education	0.048*** (0.001)	0.073*** (0.001)	0.049*** (0.001)	0.075*** (0.001)	0.049*** (0.001)	0.076*** (0.001)	0.047*** (0.001)	0.073*** (0.001)
(Constant)	- 2.383*** (0.042)	- 2.697*** (0.053)	- 2.547*** (0.041)	- 2.899*** (0.053)	- 2.522*** (0.041)	- 2.892*** (0.053)	- 2.496*** (0.041)	- 2.840*** (0.053)

N	576,331	376,688	576,331	376,688	576,331	376,688	576,331	376,688
F-statistics	1252.07	848.74	1252.45	850.20	1242.83	848.41	1253.24	846.24
p-value	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Significance: *** $p < 0.001$ ** $p < 0.05$ * $p < 0.1$

Table 5 describes probit models with weights and stratum set to survey settings, with dependent variable formal, and independent variables listed above. All models control for year, state, size of town, years worked in current job, union membership, firm size, urban/rural, and industry are also included.

Regarding the other informal search method, using the direct approach as a job search method for workers' current positions was positively correlated with the probability of the workers' current position being in the formal sector. This magnitude was larger for female workers than male workers.

Similarly, one can observe that using advertisement in a public space was positively correlated with the probability of a worker's position being in the formal sector, and the magnitude was marginally higher for female workers than male workers. The magnitude of coefficient for female workers who found their current positions through internet was positive and smaller than male workers. This suggests that using direct approach and advertisements were more strongly correlated with formal employment for female workers and male workers, while using familial search and internet search were more strongly correlated with formal employment for male workers than female workers.

As one can observe from Table 5, the coefficients for control variables such as age, age squared, married and education were similar across all regressions for each gender. The coefficient for age was positive, while for age squared was negative. This was congruent with the unified understanding that the relationship between age and formal employment was an upward facing U-shaped curve, which did not vary across gender. Interestingly, being married was positively and significantly correlated with the probability of being employed in the formal

sector for male workers, while it was negatively and significantly correlated with the probability of being employed in the formal sector for female workers. This spoke to the hypothesis that the informal sector offered more time and space flexibility for workers, which catered to the lessened availability of married women due to domestic duties. Additionally, the magnitude of positive increase associated with each extra year of education was significantly larger for female workers than for male workers, signaling a larger return to education for female workers.

4 Discussion & Conclusion

This paper uses the National Survey of Occupation and Employment in Mexico, aggregating the first quarters from year 2009 to year 2019. Using a multinomial logit model with job search strategies as the independent variable, this paper found that formal workers were less likely to have chosen informal search strategies such as direct approach and searching through friends for their current positions compared to the base category: private or public agencies, and more likely to have chosen formal search strategies such as advertisement and internet for their current positions compared to the base category. Intriguingly, one additional year of education were associated with decreased probability of having chosen all job search strategies except for internet search and other searches compared to the base category. Similarly, a marginal increase in thousands of pesos of monthly income was also associated with decreased probability of having chosen all job strategies except for internet search and other searches for their current positions. Almost all dummy variables controlling for industry of the workers' current positions were statistically and economically significant in the multinomial logit model, suggesting that there existed a clear and distinct pattern of different job search strategies across industries. Gender also had a significant effect on job search methods chosen; male workers were more likely to have employed all job search methods as opposed to using private and public agencies compared to female workers, suggesting that of all the job search strategies provided in this survey, female workers were more likely to choose public or private agencies as opposed to all other job search methods.

When including differential effects of living in different sizes of town, as well as municipality effects, being in the formal sector was positively associated with all outcome variables; formal workers had worked on average 0.911 more years on their current positions

than informal workers, they earned on average 276 pesos more than informal workers, they were associated with higher probability of receiving any kind of job-related benefits such as vacation with pay, paternity/maternity leave or profit sharing, as well as worked longer hours per week than informal workers. Intuitively, workers who searched through friends in smaller towns received lower monthly wages than workers who searched through friends in bigger towns. Although coefficients of interaction variables between size of town and searching through friends and relatives were positive when monthly wages were chosen as the independent variable, it did not offset the negative effects of living in smaller towns on monthly wages. On the other hand, the interaction variables between size of town and searching through friends were negative and insignificant when benefit were chosen as the independent variable, suggesting that workers who searched through friends in smaller towns were on average associated with smaller probability of receiving any sorts of work-related benefits than workers who searched through friends in bigger towns. Past studies have explored the differential effects of searching through social network across sizes of social networks, using sizes of town as a proxy variable. This paper could not eliminate the confounding variables between size of town and job search outcomes beside size social network, such as amount of job opportunities, and the differences in prices and purchasing power between smaller and bigger towns, therefore it has failed to draw conclusions between sizes of social networks and returns to using social network for job search purposes. Future studies could examine the effect of searching through social network on more diverse job search outcomes such as other forms of work-related benefits, hours worked overtime, and job satisfaction.

Last but not least, this paper used probit models with formal as the independent variable, and worker characteristics as the dependent variables, separately on the male and female

subsections, and found that searching through friends were negatively associated with the probability of being employed in the formal sector, and the negative effect had larger magnitude in the female subsection than the male subsection; female workers who searched through friends were less likely to be employed in the formal sector than male workers. On the other hand, workers who used internet search, direct approach or advertisement were associated with higher probability of enrolling in the formal sector than workers who did not. Female workers who searched through direct approach or advertisement were more likely to enroll in the formal sector than their male counterparts, while this pattern was reversed for workers who used internet search.

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Appendix

Table A1 Worker characteristics of job search methods: multinomial logit

		Relative to (2) public/private agency [base]				
		(1) Direct approach	(3) Friends/family	(4) Advertisement	(5) Internet	(6) Others
Formal		- 0.680*** (0.051)	-1.125*** (0.050)	0.014 (0.051)	0.193*** (0.056)	- 1.609*** (0.051)
Age		0.004** (0.002)	0.001 (0.002)	-0.002 (0.002)	- 0.017*** (0.002)	0.014*** (0.002)
Education		- 0.105*** (0.005)	-0.113*** (0.005)	-0.113*** (0.005)	0.159*** (0.057)	- 0.057*** (0.005)
Male		0.213*** (0.032)	0.245*** (0.032)	0.063* (0.033)	0.259*** (0.036)	0.108*** (0.033)
Married		-0.007 (0.035)	0.058* (0.034)	0.072** (0.035)	0.192*** (0.039)	0.043 (0.035)
Monthly income		- 0.025*** (0.003)	-0.018*** (0.003)	-0.051*** (0.003)	0.015*** (0.003)	0.008** (0.003)
Union		0.320*** (0.045)	0.264*** (0.045)	0.008 (0.046)	- 0.371*** (0.053)	0.985*** (0.046)
Urban		-0.068 (0.049)	-0.097** (0.049)	-0.094* (0.049)	-0.134** (0.055)	0.114** (0.049)
Industry Base: service						
	Manufacturing	0.148*** (0.044)	-0.274*** (0.043)	0.358*** (0.044)	-0.031 (0.049)	- 0.429*** (0.044)
	Business	0.024 (0.044)	-0.396*** (0.044)	0.514*** (0.044)	-0.098** (0.049)	- 0.498*** (0.045)
	Construction	0.535*** (0.094)	0.634*** (0.093)	-0.410*** (0.097)	0.149 (0.103)	0.584*** (0.094)
	Agriculture	0.524*** (0.148)	0.294** (0.148)	-0.571*** (0.151)	0.492*** (0.187)	0.621*** (0.148)
Firm Size Base: small						
	Medium	-0.031 (0.052)	-0.443*** (0.051)	0.011 (0.052)	0.036 (0.057)	- 0.789*** (0.052)
	Large	-0.095* (0.050)	-0.655*** (0.050)	-0.072 (0.051)	- 0.213***	- 1.354***

(Constant)	4.989*** (0.142)	6.651*** (0.141)	3.727*** (0.145)	(0.056) - 1.412*** (0.168)	(0.503) 4.351*** (0.143)
Years worked	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes
State	Yes	Yes	Yes	Yes	Yes
Size of town	Yes	Yes	Yes	Yes	Yes
N	953,019	953,019	953,019	953,019	953,019
Pseudo R ²	0.0974	0.0974	0.0974	0.0974	0.0974

*The 'others' category for industries was included in the probit model but excluded from this table due to ambiguous description and difficulty in interpretation. The 'others' category for search methods refer to either searching through a union or guild, through a temporary government employment program (federal, state and/or municipal), being simply offered a job, or through other means. The base category for industry is the service industry, and the base category for firm size is small firms (with 0 to 10 employees)



Figure A2 Percentage of Formal Employment Map

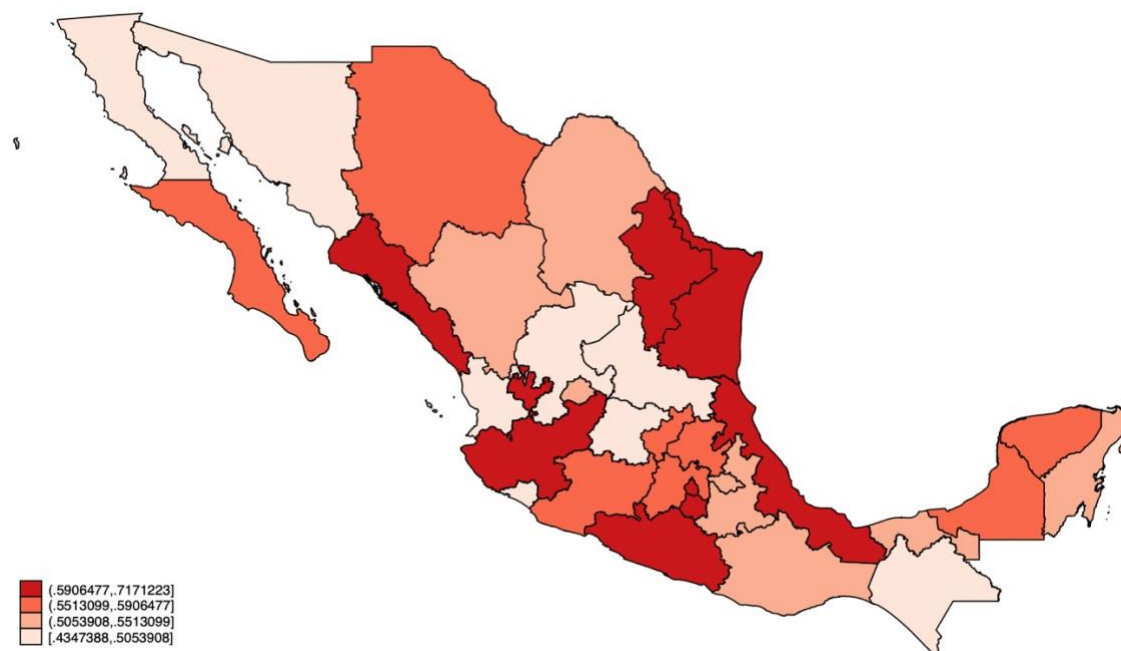


Figure A3 Usage of Familial Search Percentage Map