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AN ANALYSIS OF PUERTO RICAN INTEREST TO MIGRATE TO THE UNITED STATES USING GOOGLE TRENDS

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ABSTRACT

This study analyses the interest of Puerto Ricans in migrating to the United States as measured by Google search terms. It is publicly acknowledged that the majority of migrants from the Island in the last decade are highly skilled individuals, which means that the Island stands to lose human capital if the current migration trend continues. Therefore, it is important to investigate factors that may influence the interest of Puerto Ricans in moving before actual migration occurs. The statistical analysis was realized using an autoregressive integrated moving average model and data from Google trends. This study investigates factors influencing the interest to move (migrate) of Puerto Ricans to the five states with the highest population of Puerto Ricans (Florida, Massachusetts, New Jersey, New York, and Pennsylvania) and to the United States (U.S.) as a destination itself. The study will also make a comparison between the interest to move to the rest of the U.S. versus the interest to move to one of the specific five mentioned states. The explanatory variables affecting Puerto Ricans' interest to move were classified using a cross-disciplinary approach. The results tend to divide the five states into two broad, yet related, interest groups. First, the states of interest for job related reasons (macro level factors) are Florida and New York. Second, the states of interests for family (meso level factors) and political party (micro level factors) related reasons are New Jersey, Pennsylvania, and Massachusetts. Puerto Ricans moving to Florida and New York showed similar interests compared with New Jersey, Massachusetts and Pennsylvania, and the United States as a whole. It is found that micro-level factors positively affect Puerto Ricans' interest to move, while macro-level factors negatively affect Puerto Ricans' interest to move. The results provide policy makers with a direction through which they can identify areas where policies are needed depending on their desired goals, whether it is increasing political participation or the retention of youth through redesigning the education system or the attraction of skilled workers through the creation of jobs and increased return to human capital investment, or budgeting, social benefits and social programs. The novelty of the analysis lies in its attempt to identify factors that influence the intention to migrate before actual migration occurs.

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INTRODUCTION

Puerto Rico, is home to a population of over three million U.S. citizens as of 2010 (U.S. Census Bureau, 2011). Data from the U.S. Census reveals that the number of people living in the most populous regions of Puerto Rico has decreased since 2000. This phenomenon is important, especially to Puerto Rico, because of the risk of losing its younger and more productive population to the mainland U.S. Several studies such as Borjas (1987, 2008), Chiquiar and Hanson (2005) and Sotomayor (2008) suggest motives for migration include low migration costs, wage differentials and returns to education. Multiple studies place strong emphasis on personal and structural constraints on migration over place-utility considerations. However, few studies have examined the factors affecting the intention of Puerto Ricans to move to Mainland U.S.

It is publicly discussed that the majority of migrants from the Island in the last decade are highly skilled individuals, which means that the Island stands to lose human capital if the current migration trend continues. Therefore, it is important to investigate factors that may influence the intention of Puerto Ricans to move before actual migration occurs. As analyzed by Simmons (1986), intentions to move are strong predictors of subsequent migration. We propose to study this issue using a newly available data set available from Google, which measures search interests of a particular topic or variable.

Policies and government efforts have been focused on explaining the migration patterns through the study of the economic, geographic, social and institutional factors, among others, but little effort has been devoted to understanding the decision making process affecting the interest of Puerto Ricans in migrating to the mainland. This study will analyze factors influencing the interest to move (migrate) of Puerto Ricans to the five states with the highest population of Puerto Ricans (Florida, Massachusetts, New Jersey, New York, and Pennsylvania) and to the United States (U.S.) as a destination itself. The study will also make a comparison between the interest to move to the rest of the U.S. versus the interest to move to one of the specific five specifically mentined states.

This study follows a cross-disciplinary approach following the theoretical framework of Simmons (1986) and Haug (2008), attempting to understand the intention to migrate rather than actual migration. As depicted in recent literature, the subject of migration calls for a cross-disciplinary dialogue including macro level causal influences and perceptions through the exploration of psychology, economics and sociology.

In the second section of this paper, relevant previous literature is discussed. The literature review highlights studies that explain the migratory conditions that are specific to Puerto Rico. Studies explaining the importance of investigating the intention to migrate as opposed to actual migration as well as the factors that influence the intention to migrate are also discussed. In the third and fourth sections, the empirical model and data used for the analysis in this paper are presented and discussed. The results and findings are discussed in the fifth section. The sixth section concludes the paper with a discussion of limitations, development implications, and future research.

LITERATURE REVIEW

Multiple studies have tried to explain migration patterns and reasons to migrate between Puerto Rico and the U.S. using traditional models; however, they lack the inclusion of the interest to move and decision-making process variables. Employment conditions in Puerto Rico are one factor that influences the migratory behavior of Puerto Ricans. The Junta de Panificación de Puerto Rico (2001) created a report from 1991 to 1998 indicating that the primary intention of migrants from Puerto Rico to the U.S. is to go to work or find a job; also, 50% of the migrants from Puerto Rico had a job in Puerto Rico before migrating, suggesting that these migrants made an intentional decision to work elsewhere. In particular, the lack of absorption of the excess labor supply in the formal urban sector increases informal sector activity, creating an incentive for people to migrate (Santiago and Thorbecke, 1988).

Returns to education may be another economic factor contributing to the migration of Puerto Ricans to the U.S. This notion is supported by Borjas (2008) and by Ramos (1992); they found that the income maximization hypothesis helps explain some of the inflows and outflows of labor on the Island. In 1991, 50% of the emigrants that left the Island had doctoral degrees and a job offer waiting for them in the U.S. and 37.8% had a professional degree. The migrants having a university degree that left the island to work in the U.S. were between 34 and 54 years old. The young population leaving the island (16-34 years old) did not have a degree but did have 12 years or more of education (Junta de Panificación de Puerto Rico, 2001).

Sotomayor (2008) observes that between 1969 and 2000, the number of years of schooling of migrants from the island saw an increase; suggesting that returns to human capital are an incentive for migration to the U.S. Sotomayor explored the migration patterns of Puerto Ricans' and emphasized the effect of large differences in average wages, wage dispersion and returns to education. Specifically, the author observes a "brain drain" trend in which the years of schooling of the migrants to the U.S. has been steadily increasing. The results are consistent with migrations from regions without legal restrictions (domestic migration) and shows an outflow of the educated and skilled labor force instead of the unskilled labor force that tend to be attracted by economic reasons such as wage differentials. In all, inequality, declining migration costs and increasing human capital of Puerto Ricans appear to influence their choice to migrate to the mainland. Chiquiar and Hanson (2005) also supported this notion.

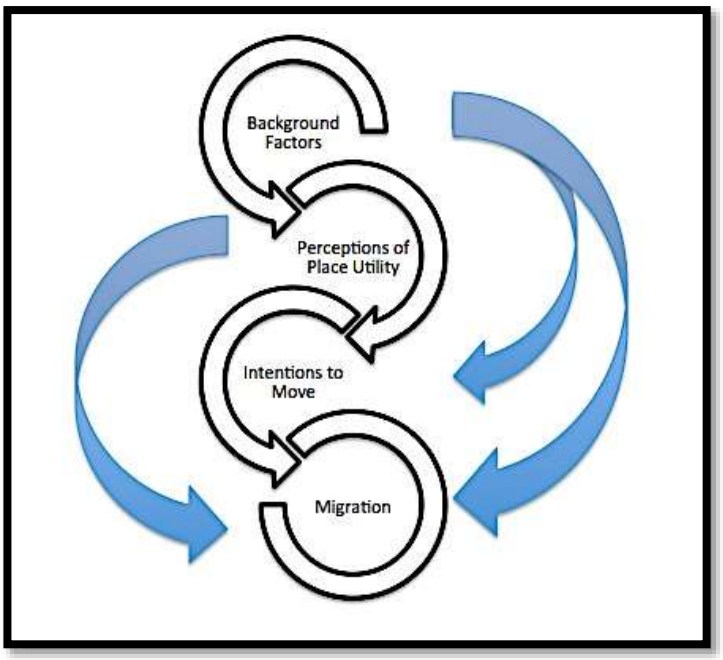
Specific mainland U.S. locations are also preferred by Puerto Ricans. For example, Collazo, Ryan and Bauman (2010) show that the population of Puerto Ricans in New York did not change from 1990 to 2008; however, the population of Puerto Ricans in Florida tripled during the same time period. Lamboy (2011) found that 25% of the total Puerto Rican migration is to Florida – this phenomenon is often explained as the result of language ties to other Puerto Ricans in Florida; however, it is expected that there are additional factors involved.

In this study we adopt an interdisciplinary approach to studying the intent to migrate as proposed by Kurekova (2011). We also follow the theoretical frameworks of Simmons (1986) and Haug (2008) to measure the interest to move rather than actual migration from Puerto Rico to the U.S. A growing number of studies, including Roistacher (1974), support the use of the intention or interest to migrate as a predictor of actual

migration.

Place utility assessments are partial predictors of actual migration, while assessments of the intentions to move are stronger predictors of subsequent migration in some settings (Simmons, 1986). Perception of place utility can be described as the satisfaction derived from an individual's perceived opinion of the intended destination. From the perspective of a conceptual model, the intentions to move would come after the perception of place utility and certainly before actual migration occurs (see Figure 1).

FIGURE 1. MODEL OF MIGRATION DECISIONS



Note: Adapted from Simmons, 1986

Ma (2000) reviewed and indicated the lack of inclusion of the social-psychological aspect of the migration process in migration theories. The rational choice approach seems to ignore how people engage in the decision to migrate and also assumes a universal pattern of migration decision making across social and cultural contexts. The author indicates that the current theoretical models disregard the process of deliberation that may play an important part in an individual's decision. Ma (2000) argued that existing theories try to explain migration based on three types of factors at the aggregate level: structural, social network and demographic, but less attention has been devoted to the study of migration decision-making.

Fredickson, et al. (1980) used the intention to move rather than the actual residential mobility in his analysis of the psychological aspects of intention to change community. The inclusion of a behavioral perspective to his model of migration intentions

resulted in observing how individuals express an interest to change community residence. It was found that community satisfaction and preference status are highly interrelated and have an independent effect upon migration intentions, regardless of socio-demographic characteristics.

Supporting this framework, Haug (2008) proposed an analytical framework to examine the role of social networks in migration decision-making. This approach is closely related to one that may be adopted by behavioral economists and it's the basis for the Meso factors included in this analysis. Haug (2008) found that social networks at the place of destination have a positive impact on migration intentions. Puerto Ricans have a long history of established social networks in the U.S. and also of returning migration from the mainland; similar or differing interests may influence both 'in' and 'out' migration. Gardner (1981) also explains that it is important to study the complete process involved in migration including the micro and macro factors affecting the process – from the intention to migrate to the actual migration.

More recent studies, Lamboy (2011) and Joo (2011), reinforced the idea of increased interest in places with desirable amenities. Amenities are one of the macro-level factors affecting migration (Monchuk and Miranowski, 2007). Amenities are important in determining quality of life, which is also an important factor in determining residential decision (Joo, 2011). Clark (2004) points out that the classic theories (land, labor and capital) are too simple; to explain the decision to migrate, interest in amenities (manmade and natural) must be considered.

With respect to the micro level place conditions Amit and Riss (2013) studied the migration decision-making process and found that demographic characteristics, social capital, and ideological motives are strong factors influencing the intention to migrate and the duration of the migration decision-making process.

Intention to migrate is also expected to be influenced by macro, meso and micro level variables. Macro-level variables include economic, cultural, demographic and ecological factors; meso-level variables include social networks and social capital while micro-level variables include human capital, cultural capital, economic capital, individual preferences and subjective expectations. In this analysis we attempt to account for variables related to macro, micro and meso-level conditions that may influence perceived place utility and the intention to migrate.

THE MODEL

The model attempts to accomplish the following: 1. Identify factors that influence the intention of Puerto Ricans to move to the U.S. 2. Identify factors that make Puerto Ricans more attracted to the states in the U.S. with the highest Puerto Rican population 3. Identify possible reasons for the high interest in Florida as opposed to other states with large Puerto Rican populations (U.S. Census Bureau 2011, Collazo, Ryan & Bauman 2010, and Lamboy 2011) 4. Compare the interests of Puerto Ricans in moving to the top five states with the highest Puerto Rican populations, relative to the rest of the U.S. 5. Use the current interest in moving to the U.S. to predict future interests in moving to the U.S.

To successfully identify factors that influence the intention of Puerto Ricans to move to the U.S. we use least squares regression to estimate the relationship between

interests to move to the U.S. and the micro, macro and meso variables. The intention or interest in migration to the U.S. is measured using the search interests of Puerto Ricans in the words 'move' and 'U.S.'; that is, 'move + U.S.' using Google trends. Each observation represents the search volume of individuals in Puerto Rico on each of the variables. The estimated model can be expressed as:

$$(\text{Move} + \text{U.S.}) = f(\text{Macro, Meso, and Micro characteristics}) \quad (1)$$

Where (Move + U.S.) is the search term used as a measure for interest in moving to the U.S. To be able to identify factors that attract Puerto Ricans to the top five states with the highest Puerto Rican populations, we use least squares regression to estimate the relationship between the interests of Puerto Ricans to move to each of these states – Florida, New York, New Jersey, Pennsylvania, Massachusetts and the macro, meso, and micro variables considered. The estimated model can be expressed as:

$$(\text{Move} + \text{State}_i) = f(\text{Macro, Meso, and Micro characteristics}) \quad (2)$$

Where (Move + State_i) is the search term used as a measure for interest in moving to each of the mentioned five states in the U.S. Specifically, an individual who intends to move would most likely search for the destination that they are interested in moving to in order to get the information necessary to make their decision or execute their move.

Possible reasons Puerto Ricans may be interested in moving to the five states with the highest Puerto Rican populations are investigated using a similar regression to equation 1 and 2; however, the dependent variable is the difference between the intention of Puerto Ricans to move to each state and the interest of Puerto Ricans to move to the U.S. Florida as opposed to the other states with high Puerto Rican populations in the U.S. is also investigated using a similar regression to equation 1 and 2; however, the dependent variable is the difference between the intention of Puerto Ricans to move to Florida and the intention of Puerto Ricans to move to the other four top ranking states in terms of Puerto Rican population. The estimated models for both of these scenarios can be expressed as:

$$(\text{Move} + \text{State}_i) - (\text{Move} + \text{U.S}) = f(\text{Macro, Meso, and Micro characteristics}) \quad (3)$$

and

$$(\text{Move+ Florida}) - (\text{Move} + \text{State}_j) = f(\text{Macro, Meso, and Micro characteristics}) \quad (4)$$

Where (Move + Florida) is the search term used as a measure for interest in moving to Florida. Equations 1 through 4 include a time trend variable.

An autoregressive integrated moving average (ARIMA) model is used to analyze how the current interest in moving may predict future interests in moving. Similar to Choi and Varian (2009), a baseline autoregressive – AR (1) model and an alternative model are adopted.

Baseline Model:

$$\text{Log}(\gamma_t) = \text{Intercept} + \emptyset\text{Log}(\gamma_{t-1}) + e_t \quad (5)$$

Alternative Model:

$$\text{Log}(\gamma_t) = \text{Intercept} + \text{Macro characteristics}_t + \text{Meso characteristics}_t + \text{Micro characteristics}_t + \emptyset\text{Log}(\gamma_{t-1}) + e_t \quad (6)$$

Where γ_t is the interest in moving to the U.S.; that is the search term, 'Move + U.S.' and log (γ_t) is the natural log of 'Move + U.S.'. Log (γ_t-1) is the natural log of the lagged value of 'Move + U.S.'. The data used for this analysis and the estimation results are presented in sections IV and V respectively.

DATA

The intention or desire to migrate reveals interest in migration, not actual migration. To be able to observe and possibly predict migration before it occurs, information about people's interest in migration is key. For this reason, we use Google trends data for the analysis presented in this paper. Google trends is data based on Google searches; it reports the frequency of an entered search term relative to the total search-volume across various regions of the world in a variety of languages. Google trends attempts to provide data in real time, and although we have not seen it applied to migration studies previously, Google trends has been discussed and used by several authors for a variety of topics most of which are related to predicting future trends and using internet based data. Some of the authors include Choi and Varian (2009), Vosen and Schmidt (2011), Choi and Varian (2012), Edelman (2012), Wu and Brynjolfsson (2013).

Choi and Varian (2009), use Google trends weekly reports on quarries about various industries to examine the correlation between query data and the current level of economic activity in the industries. The authors find that using simple seasonal AR models and fixed-effects models, and relevant Google trends variables are useful as predictors of economic activity.

Vosen and Schmidt (2011), compare private consumption based on a search query time series provided by Google trends to two survey-based indicators. The authors find that the Google indicator outperforms the survey-based indicators and suggest that Google trends provide significant benefit to forecasters of private consumption. This notion is supported by Choi and Varian (2012) who showed how search engine data can be used to forecast near-term values of economic indicators, including automobile sales, unemployment claims, travel destination planning, and consumer confidence.

Wu and Brynjolfsson (2013) use data from search engines to predict housing market trends. The authors find that using search frequencies beat the predictions made by experts from the National Association of Realtors by 23.6% for future U.S. home sales. The authors suggest that search frequency data can be used to analyze other markets, such as home appliance sales and consumer decision-making.

The major issues in using Google trends data lies in the fact that it does not represent the reality of what people actually do; instead it demonstrates the interests of

individuals in a particular idea or topic. Nonetheless, for the purpose of the analysis presented in this paper, Google trends data allows for the possibility of capturing the psychological aspects of migration before it even occurs.

The data is for weekly search interests in the variables considered from the 4th of January 2004 to the 20th of July 2014. The summary statistics for the variables used in this paper are presented in Table 1. The theoretical level of analysis (TLA) category and expected signs for each independent variable are presented in Table 2. It is important to note that the variables used in this paper represent the interests of people who searched for these topics (variables) in Puerto Rico as revealed by Google trends. For example, it is possible that the individual may be considering a local job or local political party; however, the individual is still considered to have an interest in 'job' or 'political party' based on the individual's Google search. The same is true for search interests in moving to the U.S. and any other region. The results suggest that some interests make the searching individuals more likely to have an interest in relocating to the mainland U.S.

Google trends data is indexed by nature; that is, the data is scaled from 0 to 100. The indexed data is normalized using a simple Z normalization approach $\left[z = \frac{x-\mu}{\sigma}\right]$. The normalized values of the index are used in place of the actual index to allow the estimated coefficients to capture the magnitude of the effect of changes in the explanatory variables on the dependent variable. The estimation results using this data are presented and discussed in the next section of this paper.

TABLE 1. SUMMARY STATISTICS

Variable (Search Terms)	Mean	Min.	Max.	S.D.
Move + Pennsylvania	3.8512	0	11	3.1726
Move + New Jersey	5.8058	0	18	3.7616
Move + Florida	39.3702	0	100	11.6568
Move + New York	34.0472	20	81	9.6023
Move + Massachusetts	3.3358	0	12	3.0591
Move + USA	47.7459	0	100	10.2766
Macro Level Variables				
Jobs	17.7532	0	100	8.0499
Price + Gas	18.3539	0	60	6.8594
Trade	3.8330	0	24	3.7433
Business	17.2668	0	51	8.9015
Government + Assistance	2.3249	0	15	2.7788
Security	22.4955	0	71	11.7469
Sunshine + Beach	42.2396	0	100	17.4873
Meso Level Variables				
Social + Life	59.6951	0	100	12.1756
Family	16.0563	0	44	8.5573
Micro level Variables				
University	27.1633	0	88	7.9701
Rent	5.8058	0	15	3.5696
Tax	1.9982	0	12	2.5772
Religion	9.6878	0	65	9.3383
Political + Party	34.9909	0	98	18.5283
Health	10.8947	0	34	6.2818
Time (Number of Weeks)	276	1	551	159.2043
FNY (Move + Florida) – (Move + New York)	5.3230	-81	60	10.6628
FNJ (Move + Florida) – (Move + New Jersey)	33.5644	0	100	13.6344
FPA (Move + Florida) – (Move + Pennsylvania)	35.5191	0	100	13.4264
FMA (Move + Florida) – (Move + Massachusetts)	36.0345	0	100	13.4011
FUS (Move + Florida) – (Move + USA)	-8.3757	-66	52	13.7935
NYUS (Move + New York) – (Move + USA)	34.0472	20	81	9.6023
NJUS (Move + New Jersey) – (Move + USA)	5.8058	0	18	3.7616
PAUS (Move + Pennsylvania) – (Move + USA)	3.8512	0	11	3.1726
MAUS (Move + Massachusetts) – (Move + USA)	3.3358	0	12	3.0591

Min., Max, S.D. represent minimum, maximum and standard deviation respectively.

TABLE 2. THEORETICAL LEVEL OF ANALYSIS (TLA) CATEGORY AND EXPECTED SIGNS

Variable (Search Terms)	TLA Category	Expected Sign
Jobs	Macro	Positive if the state unemployment rate is low and Puerto Ricans are interested in securing a job, negative otherwise.
Price + Gas	Macro	Positive for states with lower gas prices and negative for states with higher gas prices.
Trade	Macro	Positive if Puerto Ricans are interested in trade and if trading opportunities exist, negative otherwise.
Business	Macro	Positive if Puerto Ricans are interested in business and if business opportunities exist, negative otherwise.
Government + Assistance	Macro	Positive if Puerto Ricans are interested in government assistance and if government assistance is available, negative or neutral otherwise.
Security	Macro	Positive if the state is relatively more secure and negative otherwise. This variable involves mostly information technology security and internet, rather than safety.
Sunshine + Beach	Macro	Positive if the state has a beach and Puerto Ricans are interested in it, negative otherwise.
Social + Life	Meso	Positive if Puerto Ricans are interested in social life and if social activities are available, negative or neutral otherwise.
Family	Meso	Positive if Puerto Ricans are interested in family oriented activities, and places that promote family life, negative or neutral otherwise. This variable doesn't measure if the individual has family ties in the states.
University	Micro	Positive if Puerto Ricans have an interest to study in the state, negative otherwise.
Rent	Micro	Positive for states with lower rents, negative otherwise.
Tax	Micro	Positive for states with lower or fewer taxes, negative otherwise.
Religion	Micro	Interests in religion more likely measure the cultural predisposition of the searching individuals. A higher interest in cultural values would more likely be negatively related to interests in moving away from the Island.
Political + Party	Micro	Puerto Ricans may be more interested in moving to states where the majority of individuals share their political view. As such, the relationship may be positive or negative. For individuals that are not interested in politics, relationship would be neutral.
Health	Micro	Positive for states with better health amenities, negative otherwise.
Time (Number of Weeks)	Micro	Positive if interests in the state are increasing overtime and negative otherwise.

ESTIMATION RESULTS

The estimation results for equations 1 through 6 are discussed in this section. All of the estimated models are corrected for heteroskedasticity and tested for multicollinearity with all of the variance inflation factors (VIFs) less than 5, indicating that there is no sign of multicollinearity. The estimation results for equation 1 presented in Table 3 identifies

factors that influence the intention of Puerto Ricans to move to the U.S. One of the factors found to attract Puerto Ricans to the U.S. is their interest in sunshine and the beach. The coefficient for beach and sunshine is 0.3161 and significant at the 1% level of significance. Interest in university education is another factor influencing the interests of Puerto Ricans in moving to the U.S. The coefficient for universities is 0.1411 and significant at the 10% level of significance. This result suggests that a 1% increase in the interest to study at the university level would increase Puerto Ricans' interest in moving to the U.S. by 0.14%.

TABLE 3. ESTIMATION RESULTS FOR INTERESTS IN MOVING TO USA

	Move + USA
Constant	-0.5931 ***
	(0.2278)
Macro Level Variables	
Jobs	-0.0295
	(0.0863)
Price + Gas	-0.0575
	(0.0999)
Trade	-0.0278
	(0.0380)
Business	-0.1096*
	(0.0629)
Government + Assistance	-0.1073**
	(0.0425)
Security	0.0155
	(0.0962)
Sunshine + Beach	0.3161***
	(0.1116)
Meso Level Variables	
Social + Life	-0.0167
	(0.0598)
Family	-0.1258**
	(0.0586)
Micro Level Variables	
University	0.1411*
	(0.0729)
Rent	0.0290
	(0.0485)
Tax	-0.0350
	(0.0444)
Religion	-0.0514
	(0.0628)
Political + Party	-0.0771
	(0.0631)
Health	0.0516
	(0.0549)
Time	0.0021***
	(0.0008)
R-square	0.1656
Adjusted R-square	0.1406
Observations	551

***, **, And * imply 1%, 5% and 10% levels of significance respectively.
Heteroskedasticity consistent standard errors in parenthesis.

As opposed to interest in university education, sunshine and beaches in the U.S., interest in business, government assistance, and family tends to deter Puerto Ricans from being interested in moving to the U.S. This is not surprising as Puerto Ricans may find it more convenient to conduct business in Puerto Rico where they are used to the terrain and

culture. Puerto Ricans may also receive better government assistance from the Puerto Rican government compared to state governments in other U.S. states. As expected, individuals interested in family would more likely choose to stay close to family in Puerto Rico or move to states where they have family ties.

In the case of the U.S. as a whole, individuals interested in family choose to remain in Puerto Rico and this result is significant at the 5% level of significance. Over time, interest in the U.S. is growing; the coefficient for the time trend in equation 1 is positive and significant at the 1% level of significance.

Florida, New York, New Jersey, Pennsylvania and Massachusetts are the 5 states in the U.S. with the highest Puerto Rican populations. The results in Table 4 identify interests that attract Puerto Ricans to these five states and the results presented in Table 5 identify interests that attract Puerto Ricans to the five states relative to the rest of the U.S.

The results tend to divide the five states into two broad, yet related, interest groups: states of interest for job related reasons (macro level factors) are Florida and New York and states of interests for family (meso level factors) and political party (micro level factors) related reasons are New Jersey, Pennsylvania, and Massachusetts. Three major variables make Florida of interest: access to universities, jobs, and sunshine and the beach. Like Florida, New York is of interest for job related reasons; however, neither Florida nor New York is of interest for family related reasons and over time, interest in moving to both Florida and New York appears to be dwindling. Rent and taxes appear to be major deterrents in moving to New York. While Florida is attractive for its beaches and sunshine, relative to the rest of the U.S.; interest in Florida's beaches are statistically insignificant.

Unlike New York and Florida, the results for New Jersey, Pennsylvania, and Massachusetts reveal that individuals prefer these states are for family related reasons (meso level factors). The coefficient for interest in family is positive and statistically significant in the estimation results for each of these three states and also in the estimation results for each of these states relative to the rest of the U.S. It is also noteworthy that interests in government assistance and political parties also drive interest in New Jersey, Pennsylvania, and Massachusetts. In other words, an individual interested in family is interested in more long-term interests such as the political perspective of the location as well as the possibility of government assistance beyond interest in a job. It is not to say that jobs are not important or that jobs deter Puerto Ricans from being interested in moving to these three states; instead, while jobs are important, family, politics and government assistance are statistically significant factors that influence the interest of Puerto Ricans to move to these states.

Over time, interest in moving to Pennsylvania and Massachusetts is found to be increasing; however, when Pennsylvania is compared to the rest of the U.S. the coefficient for the time trend is negative and significant. This is also the case with New Jersey, suggesting that over time individuals are not interested in Pennsylvania and New Jersey relative to the rest of the U.S. Among all five states investigated relative to the rest of the U.S., only the time trend for Massachusetts is found to be statistically insignificant, suggesting that time is not a factor of interest in moving to Massachusetts when compared to the interest in moving to the rest of the U.S.

Among the five states investigated, Florida has the highest population of Puerto Ricans based on the 2010 U.S. Census. For this reason, we compare the other four states with high Puerto Rican populations to Florida using equation 4. The estimation results for

equation 4 presented in Table 6 suggests that jobs, university, sunshine and the beach are the major reasons why Puerto Ricans are more interested in moving to Florida as opposed to New York, New Jersey, Pennsylvania, and Massachusetts.

TABLE 4. ESTIMATION RESULTS FOR INTERESTS IN MOVING BY STATE

	Move + FL	**Move + NY**	**Move + NJ**	**Move + PA**	**Move + MA**
Constant	0.5400***	1.1115***	-0.2332	-0.5871***	-0.7711***
	(0.1271)	(0.1109)	(0.2043)	(0.1762)	(0.1749)
Macro Level Variables					
Jobs	0.1760***	0.1204**	0.0242	0.0091	0.0052
	(0.0516)	(0.0575)	(0.0393)	(0.0331)	(0.0223)
Price + Gas	0.0142	0.0149	-0.0673*	-0.0245	-0.0366
	(0.0521)	(0.0427)	(0.0384)	(0.0242)	(0.0271)
Trade	-0.1164***	-0.0356	0.0655	-0.0026	0.0836
	(0.0283)	(0.0348)	(0.0659)	(0.0695)	(0.0585)
Business	-0.1640***	-0.1168**	-0.0222	-0.0237	-0.0759***
	(0.0454)	(0.0528)	(0.0314)	(0.0319)	(0.0256)
Government + Assistance	-0.0971***	-0.0356	0.0110	0.2545***	0.1483**
	(0.0265)	(0.0316)	(0.0487)	(0.0521)	(0.0661)
Security	0.0199	-0.0473	-0.0380	-0.0626*	-0.0309
	(0.0681)	(0.0487)	(0.0356)	(0.0352)	(0.0287)
Sunshine + Beach	0.3010***	0.0776	-0.0093	-0.0229	0.0623*
	(0.0515)	(0.0517)	(0.0368)	(0.0341)	(0.0376)
Meso Level Variables					
Social + Life	-0.0276	-0.0751	-0.1009**	-0.0456	0.0296
	(0.0466)	(0.0611)	(0.0426)	(0.0280)	(0.0265)
Family	-0.1272**	-0.0863*	0.1326*	0.1200*	0.1252**
	(0.0566)	(0.0453)	(0.0736)	(0.0543)	(0.0508)
Micro Level Variables					
University	0.3431***	-0.0155	-0.1428**	-0.1094**	-0.0680
	(0.0786)	(0.0690)	(0.0562)	(0.0487)	(0.0444)
Rent	0.0570	-0.1150***	0.0644	0.0563	-0.0745
	(0.0527)	(0.0417)	(0.1406)	(0.0674)	(0.0501)
Tax	-0.0080	-0.0950***	0.0391	-0.0428	0.0361
	(0.0319)	(0.0305)	(0.0668)	(0.0523)	(0.0587)
Religion	-0.0496	-0.0209	0.0898	-0.0499	-0.0220
	(0.0466)	(0.0450)	(0.0777)	(0.0366)	(0.0285)
Political + Party	-0.0441	0.1062**	0.1557***	0.1360***	0.1325**
	(0.0465)	(0.0468)	(0.0433)	(0.0490)	(0.0524)
Health	0.0217	-0.0367	0.2028*	-0.0089	-0.0561
	(0.0447)	(0.0445)	(0.1043)	(0.0526)	(0.0405)
Time	-0.0019***	-0.0040***	0.0008	0.0021***	0.0028***
	(0.0004)	(0.0004)	(0.0006)	(0.0006)	(0.0005)
R-square	0.5566	0.5451	0.4982	0.5774	0.6145
Adjusted R-square	0.5433	0.5315	0.4831	0.5648	0.6029
Observations	551	551	551	551	551

***, **, And * imply 1%, 5% and 10% levels of significance respectively.
Heteroskedasticity consistent standard errors in parenthesis.

TABLE 5. INTERESTS IN MOVING - COMPARING FL, NY, NJ, PA, AND MA TO US

	FL-US	NY-US	NJ-US	PA-US	MA-US
Constant	0.8983***	1.2251***	0.4758**	0.3995*	0.3516
	(0.1765)	(0.1659)	(0.2233)	(0.2291)	(0.2369)
Macro Level Variables					
Jobs	0.1707**	0.1066*	0.0360	0.0313	0.0300
	(0.0672)	(0.0627)	(0.0823)	(0.0845)	(0.0846)
Price + Gas	0.0548	0.0536	0.0308	0.0484	0.0450
	(0.0835)	(0.0672)	(0.0969)	(0.0983)	(0.0983)
Trade	-0.0777**	-0.0042	0.0485	0.0261	0.0509
	(0.0328)	(0.0357)	(0.0456)	(0.0432)	(0.0449)
Business	-0.0570	0.0003	0.0951	0.0992	0.0841
	(0.0684)	(0.0542)	(0.0610)	(0.0621)	(0.0614)
Government + Assistance	-0.0021	0.0556*	0.1044**	0.1803***	0.1465***
	(0.0302)	(0.0335)	(0.0448)	(0.0486)	(0.0494)
Security	0.0052	-0.0448	-0.0276	-0.0338	-0.0239
	(0.0792)	(0.0655)	(0.0918)	(0.0944)	(0.0942)
Sunshine + Beach	0.0188	-0.1829**	-0.2994***	-0.3135***	-0.2877***
	(0.0726)	(0.0896)	(0.1062)	(0.1101)	(0.1100)
Meso Level Variables					
Social + Life	-0.0109	-0.0402	-0.0190	0.0025	0.0246
	(0.0428)	(0.0735)	(0.0560)	(0.0579)	(0.0580)
Family	-0.0138	0.0339	0.1634**	0.1579**	0.1577**
	(0.0599)	(0.0528)	(0.0665)	(0.0628)	(0.0634)
Micro Level Variables					
University	0.1849***	-0.1168	-0.1812***	-0.1696**	-0.1560**
	(0.0591)	(0.0861)	(0.0696)	(0.0713)	(0.0735)
Rent	0.0266	-0.1025**	-0.0051	-0.0112	-0.0495
	(0.0546)	(0.0405)	(0.0728)	(0.0505)	(0.0528)
Tax	0.0193	-0.0405	0.0462	0.0211	0.0442
	(0.0363)	(0.0385)	(0.0510)	(0.0491)	(0.0504)
Religion	-0.0036	0.0239	0.0789	0.0349	0.0433
	(0.0492)	(0.0535)	(0.0696)	(0.0606)	(0.0615)
Political + Party	0.0202	0.1324***	0.1257**	0.1155*	0.1127*
	(0.0589)	(0.0481)	(0.0621)	(0.0614)	(0.0622)
Health	-0.0201	-0.0645	0.0212	-0.0527	-0.0660
	(0.0521)	(0.0462)	(0.0684)	(0.0512)	(0.0562)
Time	-0.0032***	-0.0044***	-0.0017**	-0.0014*	-0.0013
	(0.0006)	(0.0005)	(0.0007)	(0.0008)	(0.0008)
R-square	0.3593	0.3948	0.1992	0.1813	0.1672
Adjusted R-square	0.3401	0.3766	0.1752	0.1568	0.1422
Observations	551	551	551	551	551

***, **, And * imply 1%, 5% and 10% levels of significance respectively.
Heteroskedasticity consistent standard errors in parenthesis.

In Table 6, interest in rent also makes Florida preferable to New York and, over time, Puerto Ricans are found to be more interested in moving to Florida compared to New York – the time trend coefficient is 0.0015 and it is significant at the 1% level of significance. However, Puerto Ricans are also found to be more interested in moving to New Jersey, Pennsylvania, and Massachusetts – the time trend coefficients are approximately -0.0020 for all three states compared to Florida and they are significant at the 1% level of significance.

TABLE 6. INTERESTS IN MOVING - COMPARING NY, NJ, PA, AND MA TO FL

	FL-NY	FL-NJ	FL-PA	FL-MA
Constant	-0.4105***	0.5260***	0.6076***	0.6458***
	(0.1462)	(0.1368)	(0.1301)	(0.1298)
Macro Level Variables				
Jobs	0.0840*	0.1438***	0.1507***	0.1519***
	(0.0508)	(0.0451)	(0.0496)	(0.0459)
Price + Gas	0.0021	0.0307	0.0181	0.0207
	(0.0590)	(0.0466)	(0.0462)	(0.0471)
Trade	-0.0952**	-0.1176***	-0.1004***	-0.1204***
	(0.0423)	(0.0310)	(0.0328)	(0.0298)
Business	-0.0741	-0.1342***	-0.1368***	-0.1254***
	(0.0658)	(0.0402)	(0.0407)	(0.0403)
Government + Assistance	-0.0741**	-0.0861***	-0.1445***	-0.1184***
	(0.0343)	(0.0255)	(0.0288)	(0.0316)
Security	0.0643	0.0275	0.0320	0.0243
	(0.0583)	(0.0620)	(0.0622)	(0.0609)
Sunshine + Beach	0.2592***	0.2599***	0.2668***	0.2476***
	(0.0671)	(0.0453)	(0.0462)	(0.0453)
Meso Level Variables				
Social + Life	0.0375	0.0043	-0.0132	-0.0307
	(0.0907)	(0.0408)	(0.0404)	(0.0402)
Family	-0.0613	-0.1454***	-0.1388***	-0.1393***
	(0.0651)	(0.0537)	(0.0514)	(0.0502)
Micro Level Variables				
University	0.3892***	0.3328***	0.3238***	0.3140***
	(0.1280)	(0.0661)	(0.0678)	(0.0689)
Rent	0.1659***	0.0309	0.0362	0.0666
	(0.0635)	(0.0681)	(0.0553)	(0.0505)
Tax	0.0769*	-0.0176	0.0032	-0.0152
	(0.0412)	(0.0313)	(0.0341)	(0.0359)
Religion	-0.0354	-0.0672	-0.0313	-0.0381
	(0.0452)	(0.0543)	(0.0403)	(0.0402)
Political + Party	-0.1439**	-0.0807*	-0.0704	-0.0686
	(0.0569)	(0.0426)	(0.0432)	(0.0436)
Health	0.0568	-0.0374	0.0210	0.0317
	(0.0497)	(0.0441)	(0.0418)	(0.0402)
Time	0.0015***	-0.0019***	-0.0022***	-0.0023***
	(0.0005)	(0.0005)	(0.0004)	(0.0004)
R-square	0.2171	0.6304	0.6335	0.6313
Adjusted R-square	0.1937	0.6193	0.6226	0.6203
Observations	551	551	551	551

***, **, And * imply 1%, 5% and 10% levels of significance respectively.
Heteroskedasticity consistent standard errors in parenthesis.

The interest of Puerto Ricans in moving to the mainland U.S. is expected to increase in the future based on the estimation results for equations 5 and 6 presented in Tables 7 and 8, respectively. The results of the ARMA (1, 1) model presented in Table 9 support the findings of the AR (1) model presented in Table 8. The results suggest that interest in the U.S. are mainly driven by interests in university education, sunshine and beaches; however, interest in business and religion (in the case of the AR (1) model), deter the interest of Puerto Ricans in moving to the U.S. When the lag variable for 'Move + USA' is included in the model the coefficient for university becomes significant while the coefficient for 'Sunshine + Beach' remains significant. Stationarity conditions are met and autocorrelation is not detected in the models.

TABLE 7. INTERESTS IN MOVING US – BASELINE MODEL - AR (1)

	Move + USA
Constant	0.0027
	(0.0350)
Move + USA_1	0.7311***
	(0.0336)
R-square	0.2996
Adjusted R-square	0.2983
Rho	-0.3661
Observations	549

*** Implies 1% level of significance.

TABLE 8. INTERESTS IN MOVING US – ALTERNATIVE MODEL - (AR 1)

	Move + USA (With lag)	**Move + USA (Without lag)**
Constant	-0.1602	-0.3993**
	(0.1534)	(0.1900)
Macro Level Variables		
Jobs	0.0072	-0.0283
	(0.0356)	(0.0496)
Price + Gas	-0.0511	0.0069
	(0.0366)	(0.0443)
Trade	-0.0318	-0.0140
	(0.0346)	(0.0568)
Business	-0.0621*	-0.0923*
	(0.0371)	(0.0473)
Government + Assistance	-0.0475	-0.0928
	(0.0361)	(0.0576)
Security	0.0106	-0.0481
	(0.0323)	(0.0534)
Sunshine + Beach	0.1236***	0.2460***
	(0.0350)	(0.0569)
Meso Level Variables		
Social + Life	-0.0475	-0.0079
	(0.0352)	(0.0451)
Family	-0.0266	-0.0544
	(0.0460)	(0.0666)
Micro Level Variables		
University	0.0111	0.1236**
	(0.0421)	(0.0517)
Rent	-0.0504	0.0056
	(0.0426)	(0.0665)
Tax	0.0002	0.0369
	(0.0325)	(0.0550)
Religion	-0.0422	-0.0850
	(0.0318)	(0.0526)
Political + Party	0.0188	-0.0517
	(0.0430)	(0.0672)
Health	0.0384	0.0038
	(0.0425)	(0.0612)
Time	0.0006	0.0015**
	(0.0004)	(0.0007)
move + usa_1	0.6586***	
	(0.0381)	
R-square	0.3476	0.2713
Adjusted R-square	0.3267	0.2494
Rho	-0.3632	0.3784
Observations	549	550

***, **, And * imply 1%, 5% and 10% levels of significance respectively.

TABLE 9. INTERESTS IN MOVING US – ARMA (1, 1)

	Move + USA
Constant	-0.4551**
	(0.2316)
Phi_1	0.7541***
	(0.0540)
Theta_1	-0.4197***
	(0.0684)
Macro Level Variables	
Jobs	-0.0181
	(0.0486)
Price + Gas	0.0026
	(0.0440)
Trade	-0.0022
	(0.0572)
Business	-0.0749
	(0.0479)
Government + Assistance	-0.0989*
	(0.0587)
Security	-0.0289
	(0.0561)
Sunshine + Beach	0.2268***
	(0.0618)
Meso Level Variables	
Social + Life	0.0092
	(0.0434)
Family	-0.0354
	(0.0697)
Micro Level Variables	
University	0.1622***
	(0.0499)
Rent	-0.0258
	(0.0677)
Tax	0.0746
	(0.0586)
Religion	-0.0887*
	(0.0519)
Political + Party	-0.0082
	(0.0674)
Health	0.0156
	(0.0599)
Time	0.0016**
	(0.0008)
AR Root 1 Modulus	1.3261
MA Root 1 Modulus	2.3826
Observations	551

***, **, And * imply 1%, 5% and 10% levels of significance respectively.

It is possible that the individuals in Puerto Rico searching on Google are searching for a variety of variables at the same time to try to get a sense of opportunities in a specific location; however, there is no sign of correlation among the independent variables considered in this analysis. This suggests that search interests in moving are the result of specific reasons; that is, while an individual may have several interests only specific interests would be significant enough to motivate their desire to move.

CONCLUSIONS

It was found that specific variables of individual states have an effect on the interest of Puerto Ricans to move. In the states of Florida and New York, Puerto Ricans seem to be interested in jobs. Florida is also found to be of interest for university, sunshine and the beach, while New York is of interest for political reasons. In the case of New Jersey, Pennsylvania and Massachusetts, a similar pattern is observed with family interests, government assistance and political party interests driving the choice to move to any three of these states. In analyzing the U.S., as a nation, the two variables found to influence the intention to move positively are university, and sunshine and the beach. Over time, interest in the U.S. is found to increase (over Florida and New York) and is also expected to increase in the future. It is found that compared to New York, Florida appeals to Puerto Ricans for interests related to jobs, university, rent, tax, sunshine and the beach. The interest in Florida as opposed to New York is found to be increasing over time. When compared to New Jersey, Pennsylvania, and Massachusetts, moving to Florida appeals to Puerto Ricans for interests related to jobs, university, sunshine and the beach. Finally when compared to the whole of the U.S., moving to Florida appeals to Puerto Ricans for reasons related to jobs and university.

After analyzing the results, it seems that Puerto Ricans are interested in moving to Florida to look for jobs and/or university education, or they are attracted to the natural amenities of the State. Lamboy (2011) described the population migrating to Florida as young adults, which makes sense, considering the interests significantly influence the intention to move to Florida. As it appears, Florida and New York are competing for a similar demographic group while Massachusetts, Pennsylvania and New Jersey may attract a more mature family oriented demographic group, especially Massachusetts and Pennsylvania since interests in moving to these two states has been found to increase over time. The U.S. Census data points out a brain drain trend from Puerto Rico to the U.S. The estimation results suggest that the interest to move out of Puerto Rico is motivated mainly by interests in jobs. It would seem that resources invested by the Puerto Rican government in social programs, healthcare, and education, among other public provisions, are being unevenly matched with employment opportunities. Specifically, policies that increase the employment opportunities among educated individuals is essential to curbing the brain drain situation that is being experienced in Puerto Rico in relation to Florida.

Political, social and economic implications arise with population and demographic changes. This is true for areas both receiving and sending migrants. Studies from Lamboy (2011), Sotomayor (2008), and Collazo et al., (2010), among others, emphasizes the increasing importance of the Puerto Rican population in the United States. Puerto Ricans are U.S. citizens who have the right to vote, allowing them to influence policies and fundamental decisions in the U.S. Increasing (or decreasing) the Puerto Rican presence in the mainland U.S. can therefore have significant political implications. This paper adds to the existing literature by investigating factors that motivate the interest in moving. The findings presented in this paper provide useful insights into the reasons Puerto Ricans are interested in migration before it occurs. Once understood, policies can be developed on the Island (or outside) to affect migration pattern. To the best of our knowledge, this is the first time Google trends data has been used to investigate interest or intention to move. The findings do not contradict theoretical expectations suggesting that

Google trends data can be used to investigate the intention to migrate among other groups of people.

A major limitation of this paper lies in the fact that it does not measure actual migration but the intention or interest in moving. This is also where the strength of this analysis lies since it provides useful insight for understanding a possible migration crisis before actual migration occurs. Future research can include a comparison between interest to move and actual migration and the inclusion of other Puerto Rican migration destinations.

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