

Some Determinants of the Puerto Rican Migration to the US in 1950-2014 ¹

José G. Caraballo-Cueto, Ph.D.²

Citation articles: Caraballo-Cueto, José (2015). "Some Determinants of the Puerto Rican Migration to the US in 1950-2014". [online] CIDE digital, April, 6(1),22-30.

Abstract *There is a myriad of theories on migration. I tested some of the most common in the related literature and found that, in the short run, only labor market factors can explain migration. In the long run, increases in minimum wage with respect to the average gross income, increases in economic growth, and increases in education appear to explain the migration dynamics. Overall, increases in homicides do not appear to be causing migration. These conclusions are based on statistical models that consider many other control variables from 1950 to 2014.*

Keywords: Migration, income, economic growth, education, Puerto Rican.

Introduction

The recent history of Puerto Rico is also history of migration. From the 1950s to the 2014, thousands of Puerto Ricans have migrated mainly to the United States. Duany (1999) argues that the migration of the 1950s was one of the most dramatic migrations in history. According to our data, from 2005-14 there was another large migration wave, similar in absolute number to the migration of the period 1951-60 but lower in relative terms.

Different reasons have caused this large migration. During the 1950s the government explicitly encouraged poor people to migrate (e.g., by providing economic incentives, among others). At that time, policy makers had the impression that agricultural workers may not have the required skills to work in the new industries that were coming to the Island. Thus, one of the reasons stated for the

¹Ponencia presentado en el Simposio sobre investigación y producción de estadísticas en Puerto Rico el jueves 26 de febrero de 2015, auspiciado por el Departamento de Ciencias Sociales del Recinto de Cayey de la Universidad de Puerto Rico.

²Assistant Professor, Business Administration College. Researcher, Institute of Interdisciplinary Studies. Director, Census Information Center, University of Puerto Rico at Cayey.

Puerto Rican migration of the 1950s was the skill mismatch created on the labor market by the industrialization.

However, there is a long and old plethora of theories for migration in the literature. Castillo-Freeman and Freeman (1992) find that the application of the US minimum wage on Puerto Rico increases migration because the minimum wage allegedly causes unemployment and unemployment raises migration. This type of argument is related to neoclassical economics, where an increase in minimum wage allegedly causes unemployment. However, Santiago (1993) finds the opposite: increases in minimum wage reduce migration to the US since workers in the Island can earn more, lowering the income gap with the US. In a sense, this last argument follows Todaro (1969) who develop a theoretical model where income differences are the main cause of migration.

Pol (2004) also finds that unemployment causes migration after controlling for other effects such as crime. And crime, according to Cebula and Alexander (2006), could be another migration determinant since it affects the quality of life.

In the recent period, the Tourist Survey 2010-12 - done by the Puerto Rico Institute of Statistics and the Planning Board - finds that almost 70% of the recent migration wave is related to work. However, it does not specify whether the reasons to migrate were because of income differences or because of unemployment.

In this letter I tested all of these theories and some others. I found that, in the short run, only the labor market can explain migration. In terms of trends, increases in minimum wage with respect to the average gross income, increases in economic growth, and increases in education appear to explain the migration dynamics.

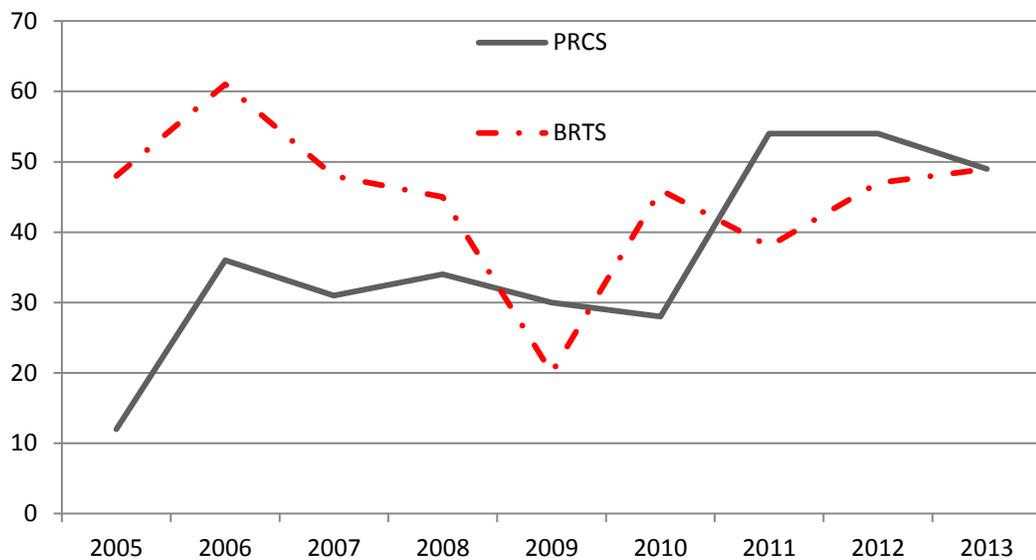
The available data and the model is presented next. In the third section I showed the results and in the fourth I state some conclusions.

Data

In the case of Puerto Rico, migration movements can be approximated by the net passenger movements (prepared by the Bureau of Transportation Statistics (BRTS) or by the Puerto Rico's Port Authority) or by the estimates inferred with the

Puerto Rican Community Survey (PRCS). To estimate migration with the PRCS, the Census Bureau asks where the person lived last year. The BRTS is a Census of passengers while the PRCS is an estimate with a margin of error of around 10% for 2013. Even though the PRCS is more suitable for counting migration, there is not annual data before 2005 because the Census Bureau measured migration in decennial censuses.

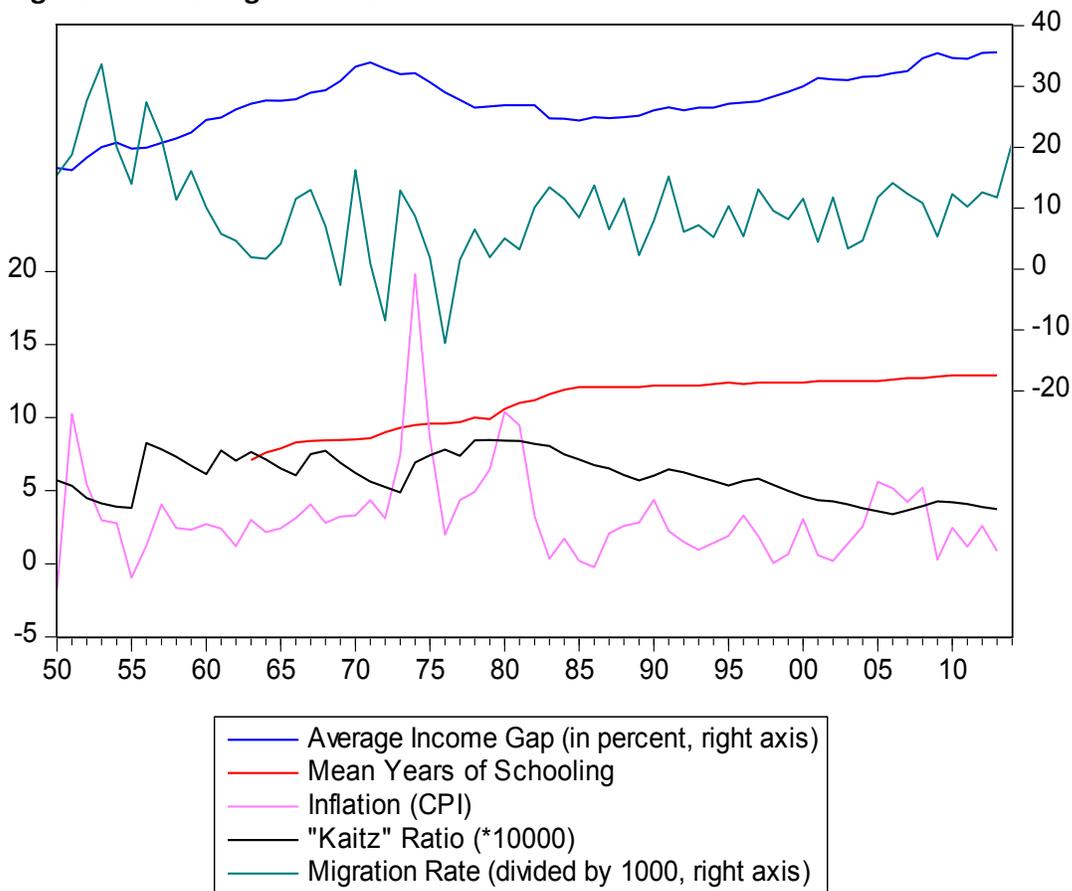
Figure 1. Two proxies for migration



To establish some type of causality we cannot limit the analysis to descriptive statistics for several technical reasons (e.g., correlation does not imply causation, unit roots, lack of control variables, and cointegrated variables, among others). To search for determinants, I need to apply the appropriate regressions with sufficient observations, which usually should be greater than 30. Since -again- there is no annual data of migration before 2005, I approximated the movements in migration by using the net passenger movements as a proxy or, more appropriately, as the instrumental variable. This method has been applied before in the related literature cited above.

The independent variables or the potential determinants are: Gross National Income (GNI) in real terms (i.e., after adjusting for the annual growth in prices); the ratio minimum wage to GNI or Kaitz ratio; murder rate; mean years of schooling (approximated from the labor force statistics, the only annual indicator available of schooling); inflation rate (using the Consumer Price Index); ratio of total employment to population, and the ratio of Puerto Rico GNI divided by US GNI (income gap). The GNI and the ratio employment to population are used to approximate the effect of the economy on the migration rate. The income gap can test the thesis of Todaro (1969) and the Kaitz ratio is used in Castillo-Freeman and Freeman (1992) to corroborate the arguments that increases in minimum wage causes migration. The inflation rate is included to control for the increases in the cost of living as a possible determinant (Cebula and Alexander, 2006).

Figure 2. Some migration determinants

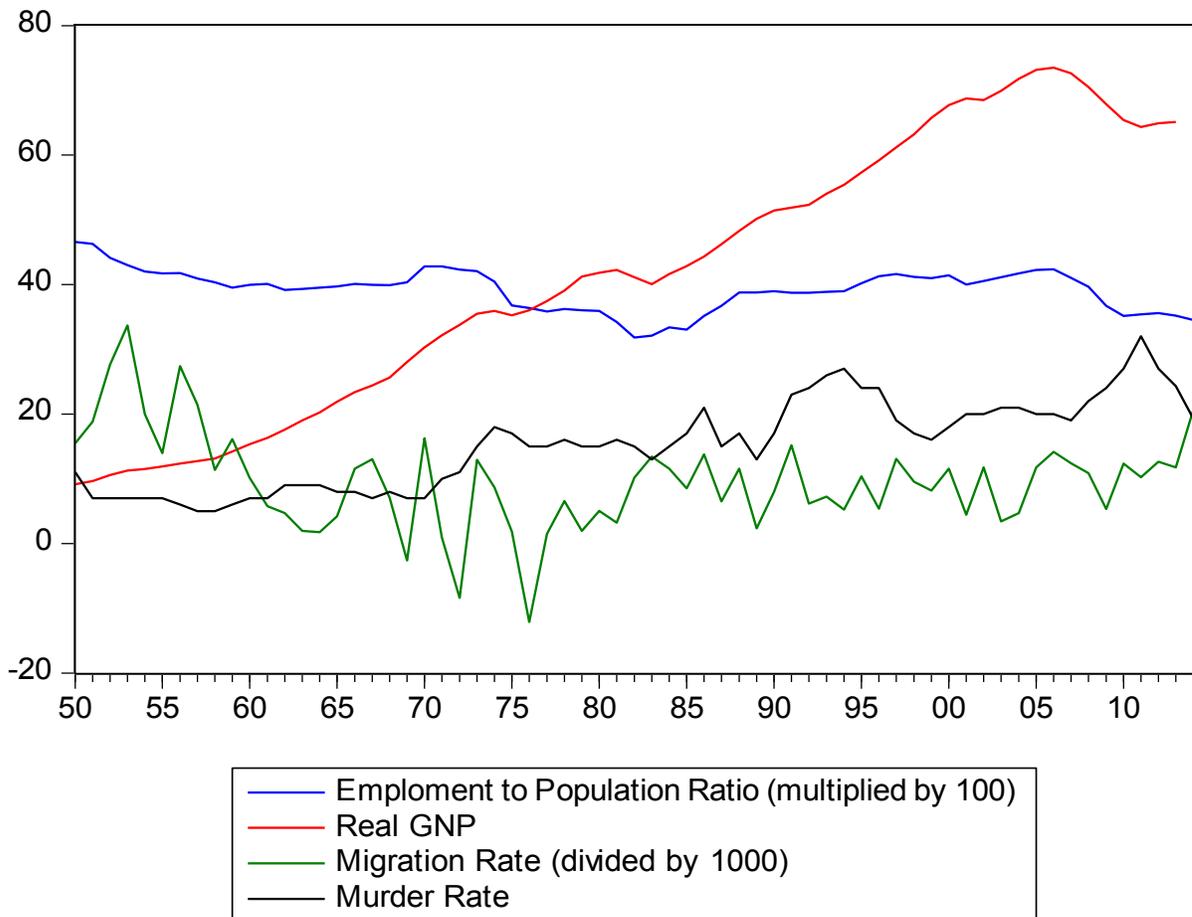


Sources: Planning Board (2014), Institute of Statistics (2014)

In Figure 2 we observe that migration rate has many short run movements (noise in technical terms) and for certain years some of the determinants could explain its movements. For instance, inflation has a high correlation with migration during the early 70s. In terms of trend, we see that the Kaitz ratio decreased from the 1980 to 2010 while the migration rate went up. Thus, the minimum wage does not appear to increase migration. In fact, if we were to keep the Kaitz ratio at the level of the 1950 (long before the application of the US minimum wage on Puerto Rico), the minimum wage in 2013 should be far greater (more than \$11 per hour) than the current \$7.25 per hour.

Similarly, murder rate had a negative correlation with migration during early 70s, mid and late 80s, and late 2000s, as showed in Figure 3.

Figure 3. Some other migration indicators



Sources: Planning Board (2014), Institute of Statistics (2014)

Results

Table 1. Firstestimation, 1950-2014

Dependent variable: MigrationRate	
LagDependent Variable	0.06 (0.17)
Inflation	0.14 (0.12)
MurderRate	0.80 (2.58)
Income Gap	-6.37 (14.2)
<i>“Kaitz” Ratio</i>	5.20 (5.57)
Schooling in t-1	22.6 (19.26)
GNI	-23.9 (15.60)
Employment to Population in t-1	26.45** (13.3)
Dummy for years when Minimum Wage Raises	0.52 (0.79)
N	49
S.E. of Regression	2.23

Notes: The ** indicates statistical significance at 95% confidence interval. Standard errors are in parentheses. S.E. stands for standard error.

Sources: Planning Board (2014), Institute of Statistics (2014)

Based on a dynamic least squares model, I found the results displayed in Table 1.¹ The model does not show problems of serial correlation or colinearity, especially after lagging the ratio employment to population ratio and the mean years of schooling. A first difference was applied to each variable to make them stationary.

It is easy to see that the inflation rate, the murder rate, the income gap between PR and the US, the mean years of schooling, the GNI, and the minimum wage were not statistically significant. In this regression the only statistically significant variable was the ratio of employment to population, which had a relatively strong direct effect on the migration changes.

This first estimation considers all the short-run movements. In Table 2 we showed our second estimation where these short-run movements are removed. To do so I applied a Hodrick-Prescott filter to detrend the variables. In this case, an increase in minimum wage relative to the average gross income would decrease the migration rate in the long run, as Santiago (1993) finds. Likewise, an improvement in the economy or an increase in the GNI tends to reduce migration.

Holding everything else equal, the strongest effect on migration in the long run came from the increase in education. In other words, the great surge in the mean years of schooling, which increased from 7.1 in 1963 to 12.9 in 2013, is having a great effect on the net movement of passengers in the long run. A possible channel is that individuals with a higher education may find more profitable to migrate than low-educated people who can earn the same US minimum wage in Puerto Rico. As education increased, more and more people may find convenient to migrate in the long run. It is important to point out that, when compared with the data collected by the United Nations Development Programme, the mean years of schooling of Puerto Rico are among the top 18 countries in the world in 2012.

¹ A dynamic OLS is given by, $M_t = M_{t-n} + X_t^1 + \dots + X_t^i + \epsilon_t$, where M is migration rate, n are the lags, X are the determinants, and ϵ is the error term that is assumed to be normally distributed with zero mean.

Table 2. Estimation using detrended variables, 1950-2014

Dependent variable: Migration Rate	
Lag Dependent Variable	-0.36** (0.18)
Inflation	-0.03 (0.69)
Murder Rate	-1.47 (1.78)
Income Gap	6.09 (7.39)
“Kaitz” Ratio	-8.02* (4.36)
Schooling in t-1	40.27** (16.45)
GNP	-22.52*** (9.22)
Employment to Population in t-1	12.60 (10.44)
Dummy for years when Minimum Wage Raises	0.18 (0.24)
N	49
S.E. of Regression	0.66

Notes: The * indicates statistical significance at 90% confidence interval, ** at 95%, and *** at 99%.
Sources: Planning Board (2014), Institute of Statistics (2014)

Conclusions

There is a myriad of theories on migration. I tested some of the most common in the related literature and found that, in the short run, only the labor market can explain migration. There is no evidence that murder rates causes migration in general. Average income differences and inflation rates are not significant determinants, at least in the statistical sense.

In terms of trends, economic growth, increases in minimum wage with respect to the average gross income, and increases in education can help to understand the migration dynamics. These conclusions are meaningful to both policymakers and scholars interested in the migration patterns of Puerto Ricans.

References

- Castillo-Freeman, A., & Freeman, R. B. (1992). When the minimum wage really bites: the effect of the US-level minimum on Puerto Rico. In *Immigration and the workforce: Economic consequences for the United States and source areas* (pp. 177-212). Chicago: University of Chicago Press.
- Cebula, R. J., & Alexander, G. M. (2006). Determinants of net interstate migration, 2000-2004. *Journal of Regional Analysis and Policy*, 36(2), 116-123.
- Duany, J. (1999). La población y la migración en Puerto Rico de cara al siglo XXI. Martínez, F.(Ed). *Futuro Económico de Puerto Rico: Antología de ensayos del futuro económico de Puerto Rico*. Río Piedras: Editorial de la Universidad de Puerto Rico.
- Pol, J.C. (2004). Determinantes Económicos de la Migración entre Puerto Rico y Estados Unidos. *Ensayos y Monografías*, Universidad de Puerto Rico, Unidad de Investigaciones Económicas, 119
- Santiago, C. E. (1993). The migratory impact of minimum wage legislation: Puerto Rico, 1970-1987. *International Migration Review*, 772-795.
- Todaro, M. P. (1969). A model of labor migration and urban unemployment in less developed countries. *The American Economic Review*, 138-148.