RACE, EDUCATION AND OCCUPATION PATTERNS IN THE RELATIONSHIP BETWEEN ASSORTATIVE MARRIAGE AND EARNINGS INEQUALITY FOR COHORTS IN BRAZIL

Ana Maria Hermeto

Extended Abstract

In recent decades, a large number of papers discusses the distribution of income in Brazil. Many agree that there is an increase in inequality during the 1980s and early 1990s, both family and individual, and a decrease in the 2000s. Changes in income distributions have many determinants: changes in the distribution of employment, declines in the lower extremes of the distribution and increases in the higher level, public efforts to redistribute income and increase participation of women in the workforce are some of the many reasons given by the literature to explain recent trends.

However, the ways in which income inequality in a society evolves over generations depend not only on labor income or human capital, but also depends on "who marries whom." The role of family and marriage has undergone profound changes in recent decades. Divorce and cohabitation became more common, age at first marriage increased for both men and women, and there has been a steady reduction in the number of children. These changes are accompanied by changes in the types of partners that individuals choose. The degree of similarity between pairs is referred as marital degree of assortative mating (assortative mating). The marital assortative mating is thus defined as the combination (or pairing) of individuals with more attributes in common than would occur by random combination. A random combination would suggest that no standard combination of attributes is brought to the partnership, which empirically is not the case. The assortative mating marital positive (or negative) according to some characteristic means that individuals tend to have partners similar (or dissimilar) with respect to this trait. Schooling is one of the main dimensions on which husbands and wives assort in their marriages (in this case, positively correlated).

More than just an indicator of family structure and social differentiation, the assortative mating is part of the marital dynamic process by which populations and social hierarchies are reproduced. In this sense, the implications of changes in their patterns can be profound. First, the increase in marital assortative mating in relation to income or wages tends to exacerbate the degree of income inequality. Second, the decline in marriage rates and increasing divorce are associated with increases in the number of single-parent households. Third, changes in the probability of marriage and the role fueling the growth of female participation in the workforce and human capital accumulation. The magnitudes of the variations depend on changes in observable characteristics and unobservable. In economics, there is extensive literature on income inequality in the labor market decisions of husbands and wives, and a smaller literature on the marital choices that assort these husbands and wives. Rarely these two lines of research are united. Theoretically, if there is a decline in the scope of specialization and women become "more like men" in terms of their behavior in the labor market, we expect that couples become more similar (positive marital assortative mating) over time. Earnings from production of public goods, economies of scale, sharing of risks and shared consumption tend to be

higher when partners are more similar in their underlying preferences. When the gains from marriage are due to specialization, men specialize in labor market and women in domestic production, and the returns to education are higher in work for the market, we expect dissimilarities relative to education. In summary, economic models suggest that increased marital assortative mating leads to an increase in inequality in income distribution among families. However, the assortative mating marriage could reduce this inequality if there was a specialization within the couple.

Economic inequality may have a cultural dimension constitutive. Making and playing through symbolic limits of lifestyles, the groups establish and maintain their hierarchical position. High levels of inequality thus tend to be correlated with cultural distance between educational groups, reducing the likelihood of marriages between individuals of different groups. The cultural perspective emphasizes the assortative mating preferences for partners with cultural tastes, values and styles of interaction similar, which would strengthen long term relationships and joint decisions involved in the union (where you live, a network of friends, how to educate children). Inasmuch as the educational level is a good indicator of cultural similarities, this would result in a homogamous (or similarity in marital assortative mating) higher education.

Some theoretical perspectives suggest that assortative mating marital education should be higher in more unequal contexts. The economic disparities have a direct influence on marital assortative mating by reducing the economic incentives for marriage between individuals of different social groups and increasing the cultural barriers between individuals with different levels of schooling. Therefore, in a context of economic disparity, such as Brazil, the contribution of marital assortative mating for inequality and its intergenerational reproduction becomes an important topic. Studies suggest that marital assortative mating contributes to income inequality between families and the intergenerational persistence economical. However, little research exists on the empirical association between marital assortative mating and economic inequality. The objective of this study is to investigate how the patterns of assortative mating and marital family arrangements in a broader sense, have changed over the last three decades in Brazil and interpret these changes in terms of their economic and social implications, as expressed in income inequality.

The starting hypothesis is: the partners in marriages have become more similar over time in Brazil? Marital assortative mating estimates based on individual level of education must take into account differences in educational distributions of men and women, who also changed differentially over time. Likewise, it seeks to explore the changing patterns of marital assortative mating in terms of ages and cohorts over time. If the income of working couples is negatively related, or if there is negative marital assortative mating in relation to this variable, it would reduce income inequality among families. This implies that if the labor income of couples is positively related, it would increase inequality. The underlying assumption, then, to be tested is: the change in income inequality in Brazil over recent decades can be in part explained by changing patterns of marital assortative mating, and how significant is this channel?

In fundamental ways, the research assumes that assortative mating is not only governed by individual preferences but also by structural constraints. That is, compositional factors of the population are always in the background of the analysis. At the most basic demographic level, the chance to join a similar partner depends on the degree of heterogeneity of population, as determined by the proportion of potential partners with a similar level of education. The chances of marriage between individuals of different groups also depend on the degree of spatial segregation and institutional education. People with similar levels of education may tend to focus on neighborhoods and institutions (schools, workplaces). Segregation would decrease the chances of individuals finding potential partners with different levels of education, increasing educational homogamous.
Families are characterized in terms of number of children, patterns of participation in the labor force and occupational structure of its members. The characterization of the type of occupational family is a key aspect of the study. The hypothesis to be investigated at this point is whether different patterns of educational and marital assortative mating group, and family structures in general, are associated to different patterns of participation in the labor market. Specifically, combinations of pairs can be traced in the following aspects: education-occupation mismatch, informality, decent work, working hours, occupation, industry, and its consequences in terms of labor income. Other sources of income in order to estimate the burden of labor income are considered when discussing these implications on inequality of income. Patterns are compared with the familiar single-parent families, advancing the discussion on the question of who joins whom to the question of who joins and who remains single.

In short, the study seeks to advance and contribute to the debate in several ways: investigating the extent and patterns of marital assortative mating and family structures in Brazil; and exploring whether and how changes in the patterns of assortative mating marital and family structures affect income inequality in recent decades in Brazil.

The data source is the microdata from PNAD, IBGE for the years 1986 to 2011. Some definitions are important. The marital union is measured every year, i.e., patterns of marital assortative mating are defined in terms of couples in a given year, regardless of duration of marriage, which is one measure of stock of the marriage. While the use of the definition of couples in marriage may be subject to bias due to marital breakup earlier, increasing schooling after marriage, and establishment of new unions, these problems would not affect couples recently formed if the goal is to provide an accurate description families. Additionally, couples with children should be distinguished from those without children, in the hypothesis that individuals with children tend to be more specialized, as a child increases the value women's time in domestic production. Likewise, single-parent families and single households are compared. The samples are restricted to individuals of 25 to 60 years old, divided into age groups of three years. The triennial cohorts are followed over time, in the accumulation of the cross-section surveys.

Education is assessed in terms of its continuous measures (years of schooling completed) and categorical (grades of schooling). One hypothesis being tested here is whether the relationship between education partner is monotonic (eg, men are less likely to have

completed high school than their wives, but more likely to have completed higher education). It is noteworthy that the study seeks to make a number of methodological dimensions. Instead of using a single measure of marital assortative mating (such as the correlation between education partners) and inequality (as the Gini coefficient), barriers to marriage between groups and income differentials between specific categories (educational, occupational , etc.) are examined. This strategy should provide a more robust test of the association between marital assortative mating educational and economic inequality. The descriptive measures of inequality to be used are: Gini and Theil indices, and the ratios between the decision 90-10, 90-50 and 50-10, as rates of dispersal. The assortative mating marriage is defined in other ways. A first measure is the absolute difference between the education partners. From the cross tabulation of the level of individual education, a far more rudimentary is the aggregation of the diagonal elements. However this measure is very sensitive to marginal distributions in education, the more unequal is the distribution of education, there will be more positive marital assortative mating. An alternative measure being used is the Kendall's tau to measure the correlation between education level of an individual and your partner. This measure requires that both be matched in any orderly manner, a positive number indicates the ranking of two variables grows, while a negative number indicates the ranking as one increases, the other decreases (the difference between probabilities of agreement and disagreement). Another measure to be tested is the marital assortative mating as a dichotomous variable: if positive, the partners are similar, and an individual with education above the median will be gender specific by associating a partner with education also above the median. Finally, an alternative measure is the product of the distances of the partners of its median weighted by standard deviations (to account for the difference in the distribution of education between men and women). This last measure resulted in a continuous variable, which considers all degrees of assortative mating, with negative numbers indicating positive and negative marital assortative mating indicating positive. Firstly, in terms of propensity to join, we describe the relationship with the evolution of education in Brazil, and track the changes in the relationship between the decades, disaggregated by sex, age and cohort heterogeneity.

Then we describe the patterns of assortative mating in terms of marital partners' education, and for the cohorts (eg, for man with 31 to 33 years of age in a given period), and changing patterns of family arrangements, over time in Brazil, and the possible geographic clippings. From contingency tables that cross education of husband and wife can be controlled by compositional effects in associations between characteristics of the partners controlling the marginal distributions using log-linear models. Both the change in the composition of education and the changing age composition of the population are controlled.

The next point in the data analysis describes the patterns of family life cycle and structure. The family structure should be characterized in terms of family size, proportions and numbers of children and adolescents (0-6 and 7-14), young adults (15-21), Adults (22-64) and elderly (65 -), the member's age younger and older, gender of household head. The educational composition of the population should be characterized in terms of averages

and distributions of schooling and quality indicators, such as the rate of age-grade gap. The characterization of labor market indicators of the families present education-occupation mismatch, working hours (full-vs.partial), informality, precariousness of employment, occupational prestige and sector of activity. All these descriptions take into account regional, gender and cohorts differences.

Then, the implications of changes and / or permanence of the identified patterns of living arrangements and marital assortative mating in terms of the distribution of labor income and household income are assessed using a model of quantile regressions. An important question to be answered at this point is the extent to which barriers to marriage between educational groups are responsible for differences in income between these groups. - Before the application of parametric regression models is through density estimates (using, for example, a weighted kernel density function) to plot the different distributions of income, according to the assortative mating patterns of marriage and family types. The backbone of the quantile regression is the investigation of the effects of occupational and educational homogamous on the distribution of income: direct effect on family income and the effects on inter-quantiles. One hypothesis is that the polarizing effect of assortative mating on occupational marital income is greater than that of education. The use of microdata POFs is that the results enable comparisons between distributions of income and consumption for the analysis of inequality.

Log-linear and log-multiplicative methods are estimated, in order to compare the pattern of racial and educational assortative mating over time in Brazil.

It is further investigated to what extent the factors that led to changes in the patterns of assortative mating and marital family arrangements have contributed to changes in income distribution between 1981 and 2008, using a modified version of a decomposition method proposed by DiNardo, Fortin and Lemeuix (1996), data from individual and family. This is a semi-parametric distributional framework, which provides a mechanism by which quantitative or qualitative checking the distributional effects of selected factors, providing more information on the distribution of family income at a specific point in time, when working with the entire density distribution and allowing the construction of counterfactual densities using weights estimated that responds to the original density distribution for these factors. The decomposition to isolate the effects, specifically for marital assortative mating, and interpret their effects on income inequality. The groups to be considered in the decomposition of income inequality are related to: labor force participation, family characteristics, marital assortative mating patterns, educational levels and demographic characteristics.

An additional line of research more specifically refers to the behavior of labor supply of married women, on the assumption that this group would determine the general increase in female participation in the labor market. Issues to be explored in this section refer to the characterization of associations between labor incomes of the spouses. Thus, for example, if there is a drop in wages of their husbands, women increase their participation? Or the female labor supply responds less to the wages of their husbands? In this case, alternative specifications should be developed, adjusted for assortative mating

bias in the wage offer and the union in separate tests for age groups and education and for mothers of young children. Some control variables to be tested are: dummies for deciles of the wage of the partner; dummies for non-labor income in the family; dummies of partner's age, presence of children young and childless, regional dummies, etc.

The analysis finds substantial variation in the strength of specific barriers to educational intermarriage, and a close association between these barriers and the earnings gaps across educational categories. Furthermore, educational marital sorting is remarkably symmetric across gender in spite of the arguably different resources that men and women bring to the union. This study highlights the limitations of using single aggregate measures of spousal educational resemblance (such as the correlation coefficient between spouses' schooling) to capture variation in assortative mating and its relationship with socioeconomic inequality.

References

Becker, E., Lindsay, C.M. 2004. Assortative Mating or Glass Ceiling: underrepresentation of female workers among top earners. ***Research in Labor Economics***, 3: 235-267.

Blossfeld, H.P., Timm, A. (eds.) 2003. ***Who Marries Whom? Educational Systems as Marriage Markets in Modern Societies***. Dordrecht: Kluwer Academic Publishers.

Breen, R., Salazar, L. 2009. ***Educational Assortative Marriage and Earnings Inequality in the United States,*** Working Paper Sociology Department, Yale University.

Brien, M.J. 1997. Racial Differences in Marriage and the Role of Marriage Markets. ***Journal of Human Resources,*** 32:4, 741-78.

Burtless, G. 1999. Effects of Growing Wage Disparities and Changing Family Composition on the U.S. Income Distribution. ***European Economic Review***, 43(4-6): 853-865.

Çelikaksoy, A. Nielsen, H S., Verner, M. 2003. ***Marriage Migration: Just another case of positive assortative matching?***, Unpublished working paper, Aarhus School of Business

Cornwell, C., Rupert, P. 1997. Unobservable individual effects, marriage and the earnings of young men. ***Economic Inquiry***, 25: 285 - 294.

Daly, M., Valletta, R. 2006. Inequality and poverty in the United States: The Effects of rising Dispersion of men's Earnings and Changing Family Behaviour. ***Econômica,*** 73: 75-98

DiNardo, J. Fortin, N., Lemieux, T. 1996. Labor Market Institutions and the Distributions of Wage, 1973-1992: A Semi parametric Approach. ***Econometrica*** 64: 1001-1044.

Ermisch, J., Francesconi, M., Siedler, T. 2006. Intergenerational Mobility and Marital Sorting. ***The Economic Journal***, 116: 659–679.

Esteve, A. 2004. Tendencias en homogamia educacional en Mexico: 1970-2000. ***Estudios Demograficos y Urbanos***, 20(2): 341-362.

Esteve, A., Cortina, C. 2006. ***Changes in Educational Assortative Mating in Contemporary Spain***.

Esteve, A., McCaa, R. 2007. Homogamia Educacional en México y Brasil, 1970 – 2000: Pautas y Tendencias. ***Latin American Research Review***, 42(2): 56-88.

Fernandez, R., Rogerson, R. 2001. Sorting and Lon-Run Inequality. ***Quarterly Journal of Economics***,116(4): 1305-1341.

Fernandez, R., Guner, N., Knowles, J. 2005. Love and Money: A Theoretical and Empirical Analysis of Household Sorting and Inequality. ***Quarterly Journal of Economics***, 120 (1): 273-344.

Gray, J.S. 1997. The Fall in Men's Return to Marriage: Declining Productivity Effects or Changing Selection? ***Journal of Human Resources***, 32:3, 481-504.

Hout, M. 1982. The Association between Husbands' and Wives' Occupations in Two-Earner Families. ***American Journal of Sociology***, 88(2): 397-409.

Jepsen, L.K. 1998. ***Do 'Likes' Still Like 'Likes' in the '90s?*** Doctoral dissertation, Vanderbilt University.

Johnson, D., Wilkins, R. 2004. Effects of changes in family Composition and Employment Patterns on the Distribution of Income in Australia: 1981-1982 to 1997-1998. ***The Economic Record***, 80: 219-238.

Juhn, C.H.; Murphy, K.N. 1997. Wage inequality and family labor supply. ***Journal of Labor Economics***, 15: 72 - 97.

Kalmijn M. 1991. Status Homogamy in the United States. ***American Journal of Sociology***, 97(2):496-523.

Kalmijn M. 1994. Assortative mating by cultural and economic occupational status. ***American Journal of Sociology***, 100:422-52

Kalmijn M. 1998. Intermarriage and Homogamy: Causes, Patterns, Trends. ***Annual Review of Sociology,*** 24: 395-421.

Kalmijn, M., Flap, H. 2001. Assortative Meeting and Mating: Unintended Consequences of Organized Settings for Partner Choices. ***Social Forces***, 79(4): 1289-1312.

Keeley, M.C. 1997. The Economics of Family Formation. ***Economic Inquiry***, 15: 238-50.

Kremer, M. 1997. How Much does Sorting Increase Inequality? ***Quarterly Journal of Economics***, 112(1): 115-139.

Lam, D. 1988. Marriage markets and assortative mating with household public goods: theoretical results and empirical implications. ***Journal of Human Resources***, 23(4): 462-87.

Lam, D., Schoeni, R. F. 1993. Effects of family background on earnings and returns to schooling: evidence from Brazil. ***Journal of Political Economy***, 101(4): 710- 40.

Lam, D., Schoeni, R. F. 1994. Family ties and labor market in the United States and Brazil. ***Journal of Human Resources***, 29(4): 1235-58.

Lazear, E. P.,Rosen, S. 1990. Male-female wage differentials in job ladders. ***Journal of Labor Economics***, 8(1): S106–S123.

Lundberg, S., Pollak, R.A. 1995. Bargaining and Distribution in Marriage. ***Journal of Economic Perspectives***, 10:4, 139-58.

Lundberg, S., Pollak, R., Wales, T. 1997. Do husbands and wives pool their resources? Evidence from the United Kingdom child benefit. ***Journal of Human Resources***.

Lundberg, S., Rose, E. 1998. ***The Determinants of Specialization within Marriage.*** Mimeo, University of Washington.

Lundberg , S., Rose, E. 2000. Parenthood and the Earnings of Married Men and Women. ***Labour Economics***, 7(6): 689-710.

Mancuso, D. 1997. ***Some Implications of Marriage and Assortative Mating by Schooling for the Earnings of Men***. Ph.D. dissertation, Stanford University.

Mare, R. 1991. Five decades of educational assortative mating. ***American Sociological Review***, 56(1): 15-32.

Mare, R. 2000. ***Assortative mating, Intergenerational Mobility, and Educational Inequality***. Working Paper CCPR-004-00. California Center for Population Research, UCLA.

Mare, R., Schwartz, C. 2006. ***Income inequality and educational assortative mating: accounting for trends from 1940 to 2003***. Working Paper CCPR-017-05, California Center for Population Research UCLA.

Mare, R. 2008. ***Educational Assortative Mating in Two Generations***. University of California.

Mortensen, D. 1988. Matching: Finding a Partner for Life or Otherwise, ***American Journal of Sociology***, 94: 215-240.

Pencavel, J. 1998. Assortative mating conjugal by Schooling and the Work Behavior of Wives and Husbands. ***American Economic Review***, 88:2, 326-29.

Pullum, T. Peri, A. 1999. A Multivariate Analysis of Homogamy in Montevideo, Uruguay. ***Population Studies***, 53(3): 361-377.

Qian, Z. 1998. Changes in Assortative Mating: The Impact of Age and Education, 1970-1990. ***Demography***, 35(3):279-92.

Qian, Z., Preston, S. 1993. Changes in American Marriage, 1972 to 1987: Availability and Forces of Attraction by Age and Education. ***American Sociological Review***, 58(4): 482-495.

Raymo, J.M.; Xie, Y. 2000. Temporal and Regional Variation in the Strength of Educational Homogamy. ***American Sociological Review***, 65(5):773-81.

Rose, E. 2001. ***Marriage and Assortative Mating: How the Patterns Change****?* University of Washington.

Schwartz, C.R., Mare, R.D. 2003. ***The Effects of Marriage, Marital Dissolution, and Educational Upgrading on Educational Assortative Mating***. Working Paper CCPR-026-03. California Center for Population Research, University of California–Los Angeles.

Schwartz, C., Mare, R. 2005. Trends in Educational Assortative Mating from 1940 to 2003. ***Demography***, 42 (4): 621–646.

Schwartz, C. 2007. ***Earnings Inequality and the Changing Association Between Spouses' Earnings***. Working Paper No. 2007-13, Center for Demography and Ecology, University of Wisconsin, Madison.

Silva, N. 2003. Duas Decadas de Seletividade Marital Educacional no Brasil. In: Hasenbalg, C., Silva, N. (eds.) ***Origens e Destinos***. Rio de Janeiro: Topbooks.

Slater, E., Woodside, M. 1951. ***Patterns of Marriage: A Study of Marriage Relationships in the Urban Working Classes***. London: Cassell.

Smits, J., Ultee,W., Lammers, J. 1998. Educational Homogamy in 65 Countries: An Explanation of Differences in Openness Using Country-Level Explanatory Variables. ***American. Sociological Review***, 63(2): 264-285.

Smits, J., Ultee, W., Lammers, J. 2000. More or Less Educational Homogamy? A Test of Different Versions of Modernization Theory Using Cross-Temporal Evidence for 60 Countries. ***American Sociological Review***, 65(5):781-88.

Solis, P., Pullum, T., Bratter, J. 2007. Homogamy by education and migration status in Monterrey, Mexico: changes and continuities over time. ***Population Research Policy Review***, 26: 279–298.

Sweeney, M., Cancian, M. 2004. The Changing Importance of White Women's Economic Prospects for Assortative Mating. ***Journal of Marriage and Family***, 66:1015-1028.

Szekely, M., Hilgert, M. 1999. ***What is behind the inequality we measure? An investigation using Latin American data***. Interamerican Development Bank-OCE Working Paper No. 409.

Torche, F. 2009. ***Educational Assortative Mating and Economic Inequality: A Comparative Analysis of Three Latin American Countries.***

Tsai, S.L.; Chung-Ming, K. 2004. ***A Quantile Regression Analysis on Family Income Determination with Mating Effects***. Unpublished Working paper

Wong, L. 1998. ***Essays on Matching and Mating: Stratification, Assimilation, and Family-Income Inequality***, Doctoral dissertation, University of Iowa.

Worner, S. M. 2006. ***The Effects of Assortative Mating on Income Inequality: A Decompositional Analysis***. RSSS Discussion Paper No. 538. Universidade Nacional Australiana.