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The Growing Importance of Family and Community: An Analysis of Changes in the Sibling Correlation in Earnings

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The Growing Importance of Family and Community: An Analysis of Changes in the Sibling Correlation in Men's Earnings

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Abstract: This study presents evidence that the correlation in brothers' economic outcomes has risen in recent decades. We use two distinct cohorts of young men from the National Longitudinal Surveys and estimate that the correlation in earnings, family income and wages between brothers rose substantially between cohorts who entered the labor market in the 1970s and those who entered in the 1980s and early 1990s. This suggests that family and community influences shared by siblings have become increasingly important in determining economic outcomes. We find that the brother correlation in education did not change between these cohorts although the return to education did increase markedly. However, the rising return to schooling can account for at most, around 40 percent of the increase in the brother correlation in earnings.

1. Introduction

Family background plays an important role in determining economic success in the U.S. For example, a number of studies have shown that the intergenerational elasticity in earnings between fathers and their children is at least 0.4 and may be as high as 0.6 (Solon, 1992; Zimmerman, 1992; Mazumder, forthcoming). These results suggest that the U.S. exhibits less intergenerational income mobility than previously thought (e.g., Becker and Tomes, 1986). But has this lack of mobility *always* been a characteristic of the U.S. economy, or is it a more recent phenomenon?

Given the well-documented rise in cross-sectional income inequality among men in recent decades (e.g., Levy and Murnane, 1992), this is an important question. Researchers have proposed many explanations for the growth in inequality ranging from skill-biased technical change and growing international trade to the rise of "winner-take-all" markets. Perhaps surprisingly, few have analyzed the possible contribution of family background as either a direct or indirect influence. For example, there might be important characteristics such as skills, looks, or social contacts that are transmitted by parents through either "nature" or "nurture" that are increasingly rewarded by the labor market. At the same time, some researchers have speculated that intergenerational income persistence may have *fallen* in recent decades due to policy interventions during the 1960s (e.g., Food Stamps), which were intended to promote equality of opportunity (Mayer and Lopoo, forthcoming).

A few studies have begun to analyze trends in intergenerational income mobility but have found differing results. These range from a finding of increased mobility among men (Mayer and Lopoo, forthcoming; Fertig, 2003), to no change in mobility (Hauser, 1998; Lee and Solon, 2004) to a decrease in mobility (Levine and Mazumder, 2002). We believe that this mixture of findings has been primarily due to data limitations combined with a focus on only one descriptive parameter, the intergenerational income elasticity.

This paper contributes to the literature in several ways. First, we use variance decomposition models to examine changes over time in the correlation in earnings between brothers. The brother correlation answers the following question: what percent of the observed variance in earnings among men is due to factors that are common to growing up in the same family? Compared to the intergenerational elasticity, the brother correlation provides a broader measure of the overall importance of a wide variety of factors common to the family ranging from parental involvement to school and neighborhood quality – not just family income. Perhaps more importantly, the brother correlation avoids many of the data problems that are inherent in trying to create a large sample of families with accurate measures of income in *two* generations for multiple cohorts.

A second contribution of this study is that we use data that has not been previously used to measure the brother correlation in earnings in two different time periods. Specifically we use two different cohorts of men from the National Longitudinal Surveys (NLS). The NLS datasets contain enough siblings from nationally representative samples that enable us to detect meaningful changes in the sibling correlation for two distinct time periods.

Using this approach we find that the brother correlation in annual earnings, family income and hourly wages has increased sharply in the U.S. for cohorts of young men born between 1957 and 1965 compared to those born between 1944 and 1952. For example, for annual earnings, the correlation has risen from 0.26 to 0.45 and the change is statistically significant. The results are robust to a variety of sample selection rules. These results are striking: For the more recent cohorts, close to half of the variance in earnings and wages can be explained by family and community influences.

The rising brother correlation offers strong evidence that family background and community influences have played an increasingly important role in determining men's economic success in recent decades. However, we find no change in the correlation in years of schooling between these cohorts suggesting that a greater association between family influences and educational attainment does not explain this increase. As far as we are aware, this is the first study to examine changes over time in the brother correlation in education.

One possible explanation for the increasing importance of family background is that family background has always mattered for education, and education is increasingly rewarded in the labor market. That is, if the relationship between family income and children's educational attainment stayed roughly constant while the returns to education rose dramatically, the intergenerational correlation of income will rise as well. We calculate an upper-bound estimate of the combined contribution of years of schooling and the return to schooling, to the brother correlation in each time period. We find that at most, only about 40 percent of the *increase* in the brother earnings correlation can be accounted for by the rising return to education. It may be the case that rising returns to other unobserved skills or other characteristics, which we cannot measure with our data, may also play an important role. This is an important area for further research.

Given these findings, there is reasonably strong evidence that intergenerational mobility has declined in recent decades. The results are consistent with the hypothesis that rising returns to various forms of skills may have resulted in a stronger intergenerational association in earnings in recent decades.

We reconcile our findings with the existing literature on changes in the intergenerational elasticity in income in two ways. First, the mixed findings with respect to the intergenerational elasticity may simply reflect the fact that there is not yet sufficient data to understand trends with respect to this parameter. Second, while the intergenerational elasticity only picks up those factors that are correlated with parent income, the brother correlation picks a broader range of factors associated with family and community influences. Thus, even if there is little definitive information on trends relating to the importance of family income, it appears that a wider set of factors shared by brothers have become increasingly important over time.

2. Background and Literature Review

Previous Studies on Changes in the Intergenerational Elasticity

In recent years a large and growing literature uses the coefficient from a regression of the log income or earnings of sons or daughters on the log income of their parents as a summary measure of intergenerational mobility.[1] The intergenerational elasticity is useful for answering questions such as: "What percent of the difference in earnings between two families is expected to persist into the next generation?"

Only a few studies have attempted to examine *changes* in the intergenerational elasticity in the U.S. over time to see whether this degree of immobility has characterized the U.S. over a long period of time. A few researchers using the PSID (e.g. Fertig, 2003; Mayer and Lopoo, forthcoming) have found suggestive evidence of a decline in the intergenerational elasticity, but the results are not always consistent over all groups examined or over all time spans. Lee and Solon (2004) also use the PSID but find no change in the intergenerational elasticity over time and suggest that the results from the other papers are an artifact of the data they use. Hauser (1998) uses the GSS from 1972 and 1996, and finds no change in the correlation between fathers' economic status and sons' economic status.[2] Levine and Mazumder (2002) use the NLS cohorts, the PSID and the GSS and find evidence of a statistically significant decline in the intergenerational elasticity when using the NLS but inconclusive evidence in the other surveys.

We believe that these ambiguous results are due to the lack of appropriate data to conclusively examine the change in the intergenerational elasticity. The PSID has relatively small samples for intergenerational analysis and has experienced considerable attrition since the panel began in 1968. This results in especially small samples when researchers attempt to limit the analysis to more recent cohorts using the PSID. For example, Levine and Mazumder (2002) and Lopoo and Mayer (forthcoming) have only about 300 families when examining recent cohorts. In addition, poorer families, which are more likely to attrite, have a higher intergenerational elasticity in earnings (Mazumder, forthcoming; Gaviria, 2002).

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[1] Recent studies include Mazumder (forthcoming) and Chadwick and Solon (2002). See Solon (1999) for a review of earlier studies.

[2] Hauser uses occupation to infer economic status by matching Census occupation codes to measures of income and education. Hauser also uses the same technique with the 1962 and 1973 Occupational Change in a Generation Surveys (OCG) and the 1986-1988 Survey of Income and Program Participation (SIPP).

The NLS cohorts can be used to construct larger samples but suffer from other problems. For the 1966 cohort, data on parents' income is reported by the sons not the parents and is categorical.[3] The GSS is a cross-sectional sample and relies on retrospective judgements about relative family income and parent occupation to approximate parental income. For these reasons it is not entirely surprising that the different datasets have yielded different conclusions.

Sibling correlations: a summary measure of shared background

An alternative approach to measuring intergenerational mobility has been to use the correlation between siblings in socioeconomic outcomes as a measure of the overall importance of family background. Using *contemporaneous* accounts of income between siblings overcomes the data problems that arose in studies of changes in intergenerational mobility over time.

Conceptually, the idea is to create a summary statistic that captures *all* of the possible effects of sharing a common family. If the similarity in earnings between siblings is not much different compared to randomly chosen individuals, then we would expect a small correlation. If, however, a large part of the variance in earnings is due to factors common to growing up in the same family environment then the sibling correlation will be sizable.

At the same time, the correlation among siblings measures *all* of the factors shared by siblings, not just having a common family. Thus the brother correlation captures factors such as the number of siblings, common neighborhoods, and the quality of schools. Conversely, some aspects of family background will not be captured including genetic traits and parental behavior towards children that are *sibling-specific*. Overall, though, the sibling correlation is a useful way to characterize how important shared family and community characteristics are in explaining the overall variance in earnings.

Previous studies on sibling correlations

An excellent review of economic studies on sibling correlations is found in Solon (1999). Solon points out that most of the early studies that examined the brother correlation used only a single year of

[3] For a small subset of families, where the parents were also interviewed, better income data is available.

earnings. These studies typically used data from the 1960s and 1970s and the central tendency of these estimates is about 0.25. Adjusting for the bias due to measurement error and transitory shocks, Solon suggests that the brother correlation in "permanent" status may be around 0.4.

There are only a few studies that produce estimates of the brother correlation in *permanent* status. Solon et al. (1991) estimate variance component models using Analysis of Variance (ANOVA). They estimate the brother correlation in the permanent component of log annual earnings to be 0.34 when using the nationally representative portion of the PSID for the years covering 1975 to 1982. They estimate the brother correlation at 0.45 when they include the oversample of poor families in the PSID, adjust for serial correlation, and use weights.[4] More recently Björklund, et al. (2002) have updated the PSID results of Solon, et al. (1991) in an attempt to compare the brother correlation in the U.S. to several Nordic countries. They use the nationally representative portion of the PSID over the time period from 1977 to 1993 and their estimates range between 0.42 and 0.45. Since the time periods of the two studies overlap they provide little guidance with respect to *changes over time*.

With respect to the NLS, there are also two studies and both use only the original cohort of young men who are tracked from 1966 to 1981, roughly the same time period as covered by Solon, et al. Altonji and Dunn (1991) estimate the brother correlation in the permanent component of log annual earnings using two different methodological approaches and their estimates are 0.32 and 0.37. Ashenfelter and Zimmerman (1997) use the same NLS cohort to study the return to education and in a table describing their sample they report a brother correlation of .31 in log annual wages averaged over 1978 and 1981. A reasonable reading of these results suggest that the brother correlation may be slightly more than 0.3 using the NLS data. It is important to note, however, that neither of the two studies using the NLS have *weighted* the sample, despite the large oversampling of black families – an issue we will revisit below.

As far as we are aware no study to date, has examined changes over time in the sibling correlation. Using two distinct cohorts of the NLS, the original 1966 cohort of young men, and the

National Longitudinal Survey of Youth (NLSY) cohorts tracked since 1979, we measure the sibling correlation for two large nationally representative samples who entered the labor market at different times. This approach will enable us to detect any meaningful changes in the correlation between brothers.[5] In addition no previous study has used the NLSY to measure the brother correlation in economic outcomes for the more recent cohort.[6]

Statistical Models and Estimation

The method to estimate the brother correlation in economic outcomes such as earnings follows Solon, et al. (1991). First, we decompose the variance of earnings residuals obtained from the following regression:

$$(1)\ \ y_{ijt} = \beta X_{ijt} + \varepsilon_{ijt}$$

The earnings for sibling j, in family i in year t are denoted as y_{ijt}. Here, the vector X_{ijt}, contains age and year dummies to account for lifecycle effects and year effects such as business cycle conditions. The residual, ε_{ijt}, which is purged of these effects is then decomposed as follows:

$$(2)\ \ \varepsilon_{ijt} = a_i + u_{ij} + v_{ijt}$$

The first term, a_i, is the permanent component that is common to all siblings in family i. The second term, u_{ij}, is the permanent component that is individual-specific. v_{ijt}, represents the transitory component that reflects noise due to either temporary shocks to earnings or measurement error in the survey. We assume that the transitory component is white noise.[7] As in previous studies we assume that these three components are "orthogonal by construction" in order to partition the variance into components that can

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[4] There is no standard error reported for the estimate using the nationally representative sample. For the 0.45 estimate, they report a standard error of 0.29. In part, this reflects an attempt to account for the clustered nature of the sampling frame in the survey.
[5] We also experimented with using the PSID but found the samples of siblings were too small and that the results were very sensitive to sample selection rules. In addition, unlike the NLS samples which start out as nationally representative in the base period for *both* cohorts, the PSID sample for the *later* cohorts is necessarily a selected sample of families that remained in the survey.
[6] Oettinger (1999) uses the NLSY79 to study the sibling correlation in years of schooling and AFQT scores but does not analyze economic outcomes.

be used to easily construct sibling correlations.[8] The variance of age-adjusted earnings, ε_{ijt}, then is simply:

$$(3)\ \ \sigma^2_{\varepsilon} = \sigma^2_a + \sigma^2_u + \sigma^2_v$$

and the correlation between brothers in *permanent* earnings, is

$$(4)\ \ \rho = \frac{\sigma_a^2}{\sigma_a^2 + \sigma_u^2},$$

or the fraction of the overall variance in permanent earnings that is common to siblings. The sibling correlation ρ is the focus of this analysis.

To estimate the model we use the ANOVA formulas presented in the Appendix of Solon, et al. (1991). These formulas adjust the classical analysis of variance estimators for differences in the number of years in earnings available for each individual, and for differences in the number of siblings within each family. We include survey weights for each year in all the estimation results. All standard errors are calculated by the bootstrap method.[9]

We also investigate the extent to which schooling and the returns to schooling may contribute to the sibling correlation and its change over time. First, we estimate the sibling correlation in years of schooling for each set of cohorts. Because an error components model is no longer necessary, we simply take the ratio of the covariance in years of schooling between all possible pairs of brothers to the variance in years of schooling for this sibling sample. This approach implicitly gives more weight to families with more siblings (Solon, Page and Duncan, 2000) but since we are interested in *changes over time* this poses less of an issue.

We also develop a simple procedure that produces an upper bound estimate of the combined contribution of schooling and the returns to schooling to the brother correlation in economic status. We

[7] In an earlier version of the paper we also considered the case where the transitory component follows an AR(1) process and found it had little effect on the results. Björklund, et al. (2000) find a similar result for the U.S.
[8] The assumption that a_i and u_{ij} are uncorrelated allows us conceptually, to divide the permanent component into a part that is perfectly correlated among siblings, and a part that is perfectly uncorrelated among siblings. For the assumption that a_i and v_{ijt} are uncorrelated we find (as did Solon et al, 1991) that there is little or no *cross-sectional* correlation in the transitory component of brothers.

simply add years of schooling to the vector *X* in (1) and reestimate the variance components model with residuals that are purged of the effects of schooling. The inclusion of schooling should sop up some of the residual variation in earnings and produce lower estimates of the family component (σ^{2*}_a) than what was found without their inclusion (σ^2_a). We then take the reduction in the variance of the family component (σ^2_a - σ^{2*}_a) as an *upper bound* estimate of the amount of the overall variance of the family component that can be explained by schooling. This is only an upper bound because it includes any omitted factors that affect earnings (e.g., perseverance) that are also correlated with schooling. The reduction in the variance of the family component divided by the overall variance of the permanent component tells us the contribution of schooling and the returns to schooling to the overall brother correlation.

3. Data

To measure the correlation in economic outcomes between brothers for two different cohorts we use two different samples from the National Longitudinal Surveys (NLS) sponsored by the Bureau of Labor Statistics. The first sample uses the Young Men Cohort, hereafter referred to as "NLS66", surveyed initially in 1966 and then nearly every year until 1981. The second sample uses men from the National Longitudinal Survey of Youth, (NLSY79) who were followed from 1979 through 2000. Both surveys oversampled blacks and so weights are used in all the analysis.

We begin by identifying men between the ages of 14 and 22 in the initial survey whose earnings are observed and are positive at least once when they are at least 26 years old.[10] For the NLS66 sample, all such years of positive earnings for the men are included in the estimation. This implies that earnings may potentially be observed in eight different years: 1970, 1971, 1973, 1975, 1976, 1978, 1980 and 1981. For the NLSY79 sample, many more years of earnings are potentially available, however, to maintain

[9] Draws are made on families using the same number of families as in the subsample used in estimation.
[10] Earnings include earnings from wage and salaries as well as business income.

comparability with the NLS66, we use the years when the sample was closest in age to the sample of the NLS66.[11]

In the NLS66 this produces a sample of 13,861 person-year observations on 3481 men in 3079 families. For the NLSY79, there are a total of 16,995 observations on 5165 men in 4285 families. As a point of comparison, Solon, et al. (1991) in their largest sample have only 2656 observations on 738 men in 583 families using the PSID. The sample characteristics are shown in Table 1.

In the main analysis the samples include siblings as well as non-siblings or "singletons". We do this in part, to maintain comparability with Solon, et al. who had too small a sample of siblings to confine the analysis only to multiple sibling families. In the next section we conduct a wide range of robustness checks that include using a sample of only siblings. For the analysis that includes years of schooling, we measure the number years of school completed by age 26.

4. Results

The estimates for the variance decomposition are shown in Table 2. The first set of results shown in Table 2 is for earnings. We find that σ^2_a, the variance of permanent component shared by siblings, rose sharply from 0.07 to 0.22 and the increase is statistically significant. The estimates for the individual-specific permanent component, σ^2_u also rose from 0.21 to 0.27 but the change was not statistically significant.[12] The implication of these changes is a sharp rise in ρ, the brother correlation in earnings. We find that ρ was just 0.26 for the NLS66 but was 0.45 for the NLSY79 and that the change is statistically significant at the 9 percent level.

For family income the results are even more striking. Although point estimates on all three variance components have increased over time, the correlation coefficient doubles from 0.21 to 0.42. The

[11] Our sample includes 1983, 1984, 1986, 1988, 1989, 1991, 1993 and 1995. The NLSY did not conduct a survey in 1995 to collect earnings data for the calendar year 1994 otherwise that would have been used to make the years perfectly parallel with the NLS66 sample.

[12] The transitory variance essentially stayed constant. In contrast, Gottschalk and Moffitt (1994) find evidence of growing transitory variance in the PSID using *all* working age males.

increase is significant at the 7 percent level. For hourly wages, we estimate that the brother correlation rises from 0.28 to 0.47 and that the change is significant at the 9 percent level.

Because we weight the sample to account for the oversample of blacks our estimated brother correlations are a little bit smaller than other studies using the NLS66. If we calculate ρ for annual earnings, unweighted, our estimate for the NLS66 is 0.33 -- almost identical to the estimate of Altonji and Dunn's (1991), 0.32, and of Ashenfelter and Zimmerman's (1997), 0.31.[13] Given the evidence that there is a higher intergenerational transmission of earnings among blacks (Mazumder 2001, Hertz, 2003), it is important to weight the samples. As far as we are aware, 0.45 is the first estimate of the brother correlation in earnings using the NLSY79.

We also examine the sensitivity of the results to a variety of sample selection rules in Table 3. Solon et al, restrict their age range to those between the ages of 10 and 17 in 1968 in order to avoid over-representing men who lived with their parents at a late age. Since our NLS cohorts have a minimum age of 14 we cannot mimic this rule. However, we do experiment with restricting the age range to those between 14 and 18. This restriction makes little difference to our estimates of the change over time for both earnings and family income. However, since the samples are considerably smaller using this age restriction, the significance levels for the change over time rise. In the case of wages, the estimate for the early period rises substantially to 0.39 but comes with an especially large standard error of 0.19. Compared to the other estimates in Table 3, this appears to be an aberration. In any case, the restriction on age produces an estimate of no change over time for wages.

We also check whether or not the results are sensitive to the inclusion of singletons. Solon, et al. (1991) speculate that including singletons in the analysis may lead to an overestimate of ρ if earnings outliers tend to be more common among singletons than siblings. This is because while singletons earnings are used to calculate σ^2_a, the numerator of ρ, they are not included in $\sigma^2_{u,}$ which is in the denominator of ρ. This might result in enlarging the estimates of the variance of the family effect relative

[13] Altonji and Dunn (1991) also produce an estimate of 0.37 when they use a method of moments approach.

to the individual effect thereby increasing the estimated brother correlation. Indeed, we do find that in most cases the estimates decline when we restrict the sample to only siblings. With this restriction the change in the earnings correlation rises to 0.22 and is now significant at the 2 percent level. The change in the correlation in family income and wages is around 0.15 and is significant at close to the 10 percent level. We interpret these results as fairly strong evidence of a rise in the brother correlation over time, since we suspect that many researchers would consider a sample of *only* siblings to be the most natural sample to use for this analysis.

As a further check we investigate the possibility that low outliers might influence the results. In row 4, we restrict earnings to be at least $100 in 1970 dollars and require that the individuals not be enrolled in school in the previous year. For earnings this appears to have a slight impact on raising the estimate for the later period (to 0.47), but has a pronounced effect on the early period (to 0.36). The increase over time is now smaller at 0.11 and is significant only at the 16 percent level. However, the changes over time for family income and wages are still large and in the case of family income become significant at the 5 percent level (with ρ rising from 0.26 to 0.43).

Finally, we combine all of the restrictions from rows 1, 2, and 3 in row 4. Here, the age restriction and the exclusion of singletons sharply reduces the number of families used in the analysis. Even with all of these restrictions, the results hold up extremely well. The brother correlation in earnings rises from 0.22 to 0.42 and the change is significant at the 8 percent level. The brother correlation in family income rises from 0.19 to 0.36 and the change is significant at the 13 percent level. Finally the brother correlation in wages rises from 0.17 to 0.46 and the change is significant at the 4 percent level. The results from Table 3 taken as a whole, suggest that the results appear to be robust to changes in sample selection rules.

How Much of the Increase is Explained By Education?

While these results present evidence that brother correlation in earnings has been rising, the natural question is what explains this phenomenon? Economists' first suspect as a determinant of earnings is usually human capital. Therefore, it is natural to examine the extent to which schooling and other forms of skills might have influenced the sibling correlation in earnings in each period. Unfortunately due to data limitations such as having common variables available for both cohorts, we can only use years of schooling as a proxy for human capital. Using the two NLS cohorts we find that correlation in years of education was almost unchanged over the period with estimates of 0.62 for the NLS66 and 0.59 for the NLSY79 (see panel A of Table 4). As far as we are aware ours is the first study to investigate changes in the correlation of years of education.[14]

These estimates are a bit higher than previous ones in the literature. Ashenfelter and Zimmerman (1997) also use the NLS66 and report a correlation in years of schooling of 0.51. However, because of different sample selection rules, their sample consists of just 143 brother pairs while we use 341.[15] We also make use of sample weights to account for the oversample of black families. Solon, Page and Duncan (2000) provide four estimates ranging from 0.51 to 0.57 using the PSID for a sample similar to our early period cohort. Our methodology, which weights each brother pair equally regardless of how many siblings are in the family, is most similar to that which produces Solon, Page and Duncan's highest estimate of 0.57. In any case, since we use the same technique in both periods, methodological considerations should not affect our conclusions concerning changes over time.

While the correlation in the *quantity* of completed schooling appears to have stayed the same over time, it might be the case that the well documented rise in the *returns to schooling* since the 1970s could account for the rise in the brother correlation in earnings. In other words, even if the association between family and neighborhood characteristics and schooling was constant over time, if the payoff to schooling in the labor market increased substantially, this might account for the increase in sibling earnings correlation. In fact, we find that estimates of the return to schooling in our samples based on simple OLS rose markedly from .035 to .093. The larger estimate for the more recent cohorts may be due in part, to the rising importance of unobservable skills that are correlated with schooling. We use the approach

[14] A few previous studies (e.g. Manski, 1993; Ellwood and Kane, 1999) have examined changes over time in the link between family income and college enrollment or graduation, with mixed evidence concerning changes over time.
[15] The main difference is that Ashenfelter and Zimmerman (1997) require positive hourly wages in 1978 and/or 1981.

described in section 2 to estimate an upper bound on how much of the brother correlation in earnings in each period might be due to the combined effects of schooling and the return to schooling. The results are shown in Panel B of Table 4.

Recall that for annual earnings the baseline estimate for the brother correlation was 0.26. We find that including years of schooling reduces the family component of variance from the .074 reported in Table 2 to .051. This reduction in the family component of .023 accounts for about .084 of the sibling correlation, or about 32 percent. For the later cohorts, we find that schooling at most accounts for about .158 of the estimated .452 correlation or about 35 percent. The estimate of the contribution of schooling to the *change* in the sibling correlation is .074 or about 39 percent. We find quantitatively similar estimates for hourly wages. For family income, we find that the estimates for the family component for the early cohorts are very small and imprecisely estimated. This might explain why schooling appears to explain nearly 70 percent of the brother correlation for this group. The estimated contribution of schooling to the sibling correlation is 40 percent for the later cohorts. As a consequence, schooling appears to explain relatively little of the rise in the correlation in family income between brothers.

Overall, it is clear that rise in the brother correlation is still substantial even if we remove the effects of schooling. So what else is responsible for the increase in the correlation over time? To begin with, it could be unmeasured forms of human capital that are shared by siblings; candidates range from the quality of schools and exposure to knowledge from parents to social networks. It could also be that there are other unobserved traits such as perseverance, confidence, height, looks or intelligence that could be shared by siblings for genetic or environmental reasons. If the labor market rewards to these characteristics have risen then this might explain a rising brother correlation. Finally it could be common peer effects or neighborhood effects that account for much the growing similarity between brothers in earnings. Explaining the other channels by which family and community have influenced children's future economic circumstances is an important area for further research. Decomposing the sibling correlation offers one approach to better understanding these channels.

5. Conclusion

We present new evidence that the importance of family background and community influences has been rising in recent decades. The correlation in earnings, family income and wages rose from around 0.25 for men entering the labor force during the 1970s, to around 0.45 for men entering the labor force in the late 1980s. The increases for all three outcomes are significant at the 10 percent level. The results appear to be robust to various changes in sample selection rules.

We do not find any change in the brother correlation in years of schooling, suggesting that the relationship between family background and years of schooling has remained stable. We also find that accounting for the rise in the *return to schooling* can, at most explain about 40 percent of the increase in the brother correlation. Understanding the underlying causes for the growing similarity in earnings for brothers remains an important area for future research.

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Table 1: Sample Characteristics

	Early Cohort		*Later Cohort*	
	Mean	*S.D.*	*Mean*	*S.D.*
Log annual earnings (1970 dollars)	8.83	0.80	8.63	0.94
Age	29.67	2.85	29.08	2.45
Black	0.21	0.41	0.26	0.44
Years of education by age 26	13.14	2.72	12.67	2.49
Families	3079		4285	
Individuals	3418		5165	
Singletons	2770		3545	
Person-Years	13861		16995	

Note: Based on samples used to estimate brother correlation in earnings in Table 2 (unweighted)

Table 2: Changes in the Brother Correlation in Economic Outcomes

Log Annual Earnings	*Early Cohorts*	*Later Cohorts*	*Change*	*t-stat*	*p-value*
Family component	0.074	0.222	0.148	3.48	0.000
	(0.04)	(0.02)	(0.04)		
Individual component	0.208	0.269	0.061	1.26	0.103
	(0.04)	(0.03)	(0.05)		
Transitory component	0.335	0.330	-0.005	-0.12	0.454
	(0.03)	(0.03)	(0.04)		
Correlation	**0.263**	**0.452**	0.189	1.36	0.087
	(0.13)	(0.05)	(0.14)		
N	13861	16995			

Log Family Income	*Early Cohorts*	*Later Cohorts*	*Change*	*t-stat*	*p-value*
Family component	0.046	0.257	0.211	4.17	0.000
	(0.03)	(0.04)	(0.05)		
Individual component	0.176	0.362	0.186	4.18	0.000
	(0.03)	(0.03)	(0.04)		
Transitory component	0.252	0.396	0.144	5.02	1.000
	(0.02)	(0.02)	(0.03)		
Correlation	**0.207**	**0.415**	0.208	1.48	0.069
	(0.13)	(0.06)	(0.14)		
N	13472	16472			

Log Hourly Wages	*Early Cohorts*	*Later Cohorts*	*Change*	*t-stat*	*p-value*
Family component	0.044	0.126	0.082	3.02	0.001
	(0.02)	(0.02)	(0.03)		
Individual component	0.114	0.141	0.027	0.97	0.167
	(0.02)	(0.02)	(0.03)		
Transitory component	0.231	0.235	0.004	0.19	0.576
	(0.01)	(0.02)	(0.02)		
Correlation	**0.277**	**0.472**	0.195	1.35	0.088
	(0.13)	(0.07)	(0.14)		
N	12575	15977			

Note: All estimates are weighted. Standard errors are bootstrapped using 50 iterations.
p-values use a one tailed test that the change in absolute value is significantly different from zero

Table 3: Sensitivity Analysis of Changes in the Brother Correlation

Estimates of the brother correlation
Standard errors in parentheses
Number of families

	Early Cohorts	*Later Cohorts*	*change*	*t-stat*	*p-value**
1. Ages 14 to 18 in base year					
Earnings	0.204	0.384	0.181	1.009	0.157
	(0.15)	(0.10)	(0.18)		
	2071	2648			
Family Income	0.155	0.406	0.251	1.253	0.105
	(0.17)	(0.10)	(0.20)		
	2087	2664			
Wages	0.394	0.389	-0.004	-0.019	0.492
	(0.19)	(0.12)	(0.23)		
	1989	2572			
2. Remove Singletons					
Earnings	0.215	0.438	0.224	2.103	0.018
	(0.09)	(0.05)	(0.11)		
	309	740			
Family Income	0.258	0.391	0.133	1.185	0.118
	(0.10)	(0.06)	(0.11)		
	311	749			
Wages	0.308	0.462	0.154	1.227	0.110
	(0.11)	(0.05)	(0.13)		
	289	703			
3. Min. Earnings and Enrollment					
Earnings	0.358	0.470	0.111	0.994	0.160
	(0.10)	(0.06)	(0.11)		
	3030	4216			
Family Income	0.257	0.428	0.171	1.653	0.049
	(0.09)	(0.05)	(0.10)		
	3032	4164			
Wages	0.279	0.461	0.182	1.121	0.131
	(0.15)	(0.07)	(0.16)		
	2938	4058			
4. Combine all three restrictions					
Earnings	0.221	0.418	0.197	1.408	0.080
	(0.12)	(0.07)	(0.14)		
	198	405			
Family Income	0.189	0.364	0.175	1.121	0.131
	(0.14)	(0.06)	(0.16)		
	202	413			
Wages	0.171	0.462	0.291	1.701	0.044
	(0.16)	(0.06)	(0.17)		
	183	378			

Note: All estimates are weighted. Standard errors are bootstrapped using 50 iterations.
p-values use a one tailed test that the change in absolute value is significantly different from zero

Table 4: Contribution of Education to the Brother Correlation

Panel A:
Brother Correlation in Years of Education

	Early Cohorts	*Later Cohorts*
estimate	0.620	0.590
N	341	1008

Panel B:
Upper Bound Estimates of the Contribution of Schooling to the Brother Correlation in Earnings

Log Annual Earnings	*Early Cohorts*	*Later Cohorts*	*change*
Baseline Estimate	0.263	0.452	0.189
Schooling Contribution to Corr.	0.084	0.158	0.074
% contribution	32%	35%	**39%**

Log Annual Family Income	*Early Cohorts*	*Later Cohorts*	*change*
Baseline Estimate	0.207	0.415	0.208
Schooling Contribution to Corr.	0.143	0.165	0.022
% contribution	69%	40%	**11%**

Log Hourly Wages	*Early Cohorts*	*Later Cohorts*	*change*
Baseline Estimate	0.277	0.472	0.195
Schooling Contribution to Corr.	0.093	0.183	0.090
% contribution	34%	39%	**46%**

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