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I. Introduction

Adopting a child is not an easy undertaking. In fact, adopting a child requires a lot of thought and effort as very specific procedures must be followed in order to obtain a child through adoption. According to the Evan B. Donaldson Adoption Institute (2007), an adoption can cost anywhere between $4,000 and $30,000 assuming the adopted child is not from foster care. Also, an average adoption takes approximately eighteen months during which the family looking to adopt must pass certain criteria put forth by agencies. Thus, it is not a process to be taken lightly and is often taken on by families of higher than average socioeconomic status due to the expense. While adoption is an old practice, recently its popularity has increased despite all of the difficulties in having a successful adoption process because of the push for international adoption. The National Council for Adoption (2007) reports that there were 4,323 international adoptions in 1973. This figure has dramatically increased as there were 22,911 inter-country adoptions in 2004. There was approximately the same amount of unrelated domestic adoptions in 2004. So there are approximately 46,000 adoptions each year in the United States.

Adoption provides unique insight into families because it does not involve genetics. This natural experiment allows researchers to separate the effects of biology and the family environment. The amount of valuable information to be gained from studying these families has induced a number of disciplines to conduct studies comparing the behavior and abilities of adopted children to biological children. Other studies have also compared adopted children to both their adopted and biological parents. A lot of studies, such as the ones completed by Joseph Horn (1983), Bruce Sacerdote (2002), and by Sandra Scarr and Richard Weinberg (1978), have focused on intelligence through IQ scores to compare the children and their parents.

My study is different, as it examines the outcomes of young-adults who were adopted versus those who were not. By measuring educational attainment and income, I believe that this is a better study as it measures an application of intelligence. It looks at the true circumstances of the young adult's life, especially since society tends to evaluate people not on their IQ but instead considers their educational attainment and income. My study will be similar to one conducted by Andres Bjorklund and Katarina Richardson (2000), except I use data from the United States rather than Sweden.

I will be able to determine whether or not being adopted has any significance in predicting outcomes, especially educational attainment and income. I will also compare how strong the effects of different family background characteristics are in predicting young adults' outcomes. If the family background characteristics have a large impact on adopted children's outcomes, I will be able to conclude that the characteristics of the family have the most influence on the development and future performance of children. However, if there is little correlation between family background and adopted children's outcomes, I will be able to conclude that biology or some other immeasurable effects have a stronger influence in the development and success of children.

This paper proceeds as follows: Section II discusses the past research on adoption and predicting the outcomes of young adults. It reviews the traditional make up of the family structure of many families with adopted children. This section will also discuss the theoretical framework based on human capital theory. Section III describes the National Longitudinal Survey of Youth (NLSY) data set and explains the empirical model. Section IV presents the results from the regression analysis. Finally, Section V concludes by discussing my results and suggesting policy implications.

II. Literature and Theoretical Model

A. Background

The research on adoptive children has found that these children's family structures tend to be slightly different than the average children's family structure when they are raised by their biological families. Christine Bachrach (1983), a sociologist, reviews children in varying family types and paints the following picture of the American family with adopted children. Adoptive parents tend to be older than biological or stepparents with a child of the same age; almost all of the children have a mother over the age of twenty five. The older ages of adoptive parents might help explain that adopted children tend to be raised in homes with fewer children. Approximately 63% of adopted children live in households with two children or less, while only 39% of households with biologically raised children had two or fewer children. Also, only 2.1% of the adopted children studied live below the poverty line while approximately 9.4% of biological children do. This could be related to the findings that more adoptive children live in two parent households (96%) and that adoptive parents tend to have higher levels of education (Bachrach, 1983). The selective placement by adoption agencies might explain why families with adopted children tend to be better off.

The trends in the Bachrach study are consistent with the sample from the National Longitudinal Survey of Youth (1996), which I use in my own analysis. I will discuss my data in greater depth in Section III, but I have included some of the descriptive statistics in Table 1 which highlight the differences in the outcomes and family background of adopted and biologically raised children.

Previous research on the difference between the intelligence of adopted children versus biological children often compares IQ scores. A few studies have been able to gain access to some unique data that includes the IQ score of both the biological and adoptive mother, as well as the child. The Texas Adoption Project, conducted by Joseph Horn (1983), finds that no matter how they compared the scores, the children's IQ scores are more similar to the people to whom they were biologically related. Adoptive parents' IQ scores tend to resemble their natural children's more than their adoptive children's, even though both children were raised in the same environment. Natural children's IQ scores better parallel with their biological siblings rather than with their adopted siblings. He finds that adoptive children's IQ scores have twice the amount of correlation to their natural parents than their adoptive parents. It seems that adopted children resemble "strangers" or their biological mothers more than their adoptive mothers. In addition, children from higher IQ biological mothers tended to have higher abilities than those from lower IQ biological mothers, even though their family environment was similar (Horn, 1983).

A majority of studies including both the above and the Scarr and Weinburg (1978) study, conclude, that "biology plays a larger role in determining intelligence than family variables". Like the Scarr and Weinburg study, most use IQ as a measure of intelligence. However, one study completed in Norway uses school test scores and teacher responses instead of IQ tests (Dalen, 2006). Dalen compares internationally adopted children to domestic children. She finds little difference in their intellectual ability as measured by government issued standardized tests. Also the teachers do not report any difference in the child's language ability, both academic and everyday (Dalen, 2006).

B. Human Capital Model

The human capital model helps to explain how productive a person can be given many inputs such as education, language skills, physical abilities and technical skills. Recall that education is an investment in human capital which leads to increased productivity which allows more income to be earned.

Table 1: Descriptive Statistics for National Longitudinal Survey of Youth Sample

	Means of Descriptive Statistics	
	Adopted	Biological
Dependent		
Highest Grade Completed	13.46	12.97
Income	$ 34,919	$ 27,308
Independent		
Highest Grade Completed M	11.99	10.86
Highest Grade Completed F	12.16	10.94
Number of Siblings	1.96	3.87
White	83%	69%
Poverty in 1978	19%	28%

Productivity is the output from people's work given their inputs so this study examines both sides of the chain by examining both education and income. Gary Becker has written many classic studies on the family unit and its influences on the accumulation of human capital. I use his discussion with Nigel Tomes (1986) regarding human capital accumulation to develop the primary theory explaining young adults' outcomes.

Becker and Tomes (1986) assume that the amount of human capital one is able to obtain later in life is proportionate to the amount received in childhood. Therefore, one will be able to gain more human capital from education or on-the-job training if he or she starts with better "endowments." It is intuitive that with better access to educational opportunities, a child is more likely to be successful in adulthood.

According to Becker (1986), children with genetically well-endowed parents tend to also have above average endowments of abilities based on genetics, while children with poorly endowed parents also have below average endowments. However, the mean for the below average endowed children has a larger deviation. Genetic make-up will influence the marginal effect of the family expenditure on the children's human capital accumulation (Becker, 1986).

Mary Corcoran, Christopher Jencks, and Michael Olneck (1976) add some additional thought about the way parents impact their children's development. They believe that parents' attitudes will greatly impact their children's development. Parents teach their children proper manners and ways to effectively interact with others. Parents can also pass down work ethic, which is pivotal in achieving a certain level of education and earning a high income. They found that these immeasurable characteristics such as interpersonal skills, have a strong effect on success later in life (Corcoran, *et al* 1976).

Parents not only pass on their own abilities and motivations, but also influence their child's skills, learning, health, and other characteristics by their expenditures of time and money on their child. Becker (1986) also argues that incomes, preferences, and number of children will affect their expenditures. Parents are expected to maximize their children's welfare by providing optimum opportunities for learning and bettering themselves (human capital accumulation), given that it does not severely limit the parents' own consumption. Therefore, Becker (1986) assumes that children from better-endowed families will have higher levels of human capital.

C. Competing Effects

Anders Bjorklund and Katarina Richardson (2000) completed a study upon which I model mine except that they studied children adopted in Sweden. They explained that the factors influencing young adults' outcome are from the their family background and other variables such as genetics and adoption effects. They test which set of factors is strongest in explaining the levels of education and the income amounts earned by young adults. They compare these results of their two samples, of which one is of adopted children and the other is of biologically raised children. They titled these two competing effects the "Family Background Effect" and the "Adoption Effect" (Bjorklund *et al*, 2000). I will carry these titles throughout my paper as well.

The Family Background Effect explains a lot of what was discussed above in the human capital model. The more investment people have in themselves, the more productive they should be. In the section titled Background above, I argue that families that adopt children tend to be of higher than average socioeconomic status. Their higher level of income gives them more wherewithal to invest in their children's educations. In addition, the level of parents' education is a major part of the Family Background Effect. Children adopted by parents with higher levels of educational attainment have an example to follow which might be very powerful in influencing their own educational decisions.

Further adding to the positive family environment, Bjorklund and Richardson (2000) suggest that adoptive families tend to be more stable than the average family with biological children. Families undergo extensive screening before they are allowed to adopt and testing the strength of the marriage is part of the screening. Secondly, the Family Background Effect might work in the direction of the families with adopted children because they are usually smaller than families with biological children. This allows the family to put a larger amount of resources towards the investment in human capital (Bjorklund *et al*, 2000).

The Adoption Effect, on the other hand, might work against the Family Background Effect which attempts to capture the hypothesized, more ideal family setting of the average adopted children. Andres Bjorklund, Mikael Lindahl, and Erik Plug (2006) suggest that children who are adopted might have been subject to less than standard pre- and post- birth care which can negatively affect their development and thus affect their outcomes as young adults. A mother who gives her child up for adoption might not have had the resources to obtain proper prenatal care by

having regular visits to the doctor or the proper vitamins. Plus, she may have been less concerned with insuring the baby was healthy in general. There are a number of adopted children whose biological mothers abused drugs or alcohol during pregnancy. The negative Adoption Effect could continue to grow due to post-birth circumstances. Some children are placed into institutions before they are adopted into families (Beckett, 2007). This type of care is not ideal because children often do not receive enough attention and stimulation. Lastly, adopted children might emotionally suffer from a feeling of separation or lack of belonging (Bjorklund *et al* 2006).

In their research comparing biological and adopted children in Sweden, Bjorklund and Richardson (2000) found that the "Adoption Effect" seems to prevail over the "Family Background Effect" when comparing adopted children to their siblings who are biologically related to their parents. In fact, the biological children of the family tend to achieve two more years of education than their adopted siblings. However, in general, they found that average Swedish biologically raised children tend to achieve the same amount of education attainment as adopted children.

III. Dataset and Empirical Model

The National Longitudinal Survey of Youth (NLSY) is used in order to complete this study. This dataset, compiled by the Bureau of Labor Statistics, started following a cohort of over 12,000 people that were between the ages of 14 and 21 in 1979. It asked them a number of questions about their jobs, education, families, and lives in general. It continues to follow this group as best as possible so that it can update the people's information and ask them new questions every year.

The sample of adopted children was restricted to those who were living with their adoptive parents at or before the age of two. To be counted as adopted, neither of the child's parents could be a biological parent, in order to eliminate children adopted by a step-parent. The age restriction gives children more time to acclimate to their family and provides a better long-term comparison between the Family Background and Adoption Effects. I also might be able to avoid some major developmental or emotional problems due to a late adoption, which would cause the Adoption Effect to be stronger. There are 109 adopted children included in this study to be compared with the biological children in the sample.

First I will run two linear regressions, one for educational attainment and one for income with the dependent adoption variable as the main variable of focus. Educational attainment will be measured by

the highest grade completed as of 1996 and income will be measured by the total of wages and salaries in 1996. The Adoption Effect will be captured by the adoption dummy variable. There will also be controls for variables that influence the Family Background Effect. Therefore, if I find that these variables are significant and the adoption dummy variable is not significant, then the family characteristics have explained the variation. Thus, I would conclude that the Family Background Effect will prevail over the Adoption Effect. However, if the adoption dummy variable has a significant coefficient in predicting outcome while controlling for the Family Background Effect, I will see that there are still other factors that explain the outcome for adopted children, and thus, the Adoption Effect is still very strong. The two regressions are as follows:

$$\text{Highest Grade Completed} = \alpha + \beta_1(\text{Adopted}) + \beta_2(\text{HGC\_Mother}) + \beta_3(\text{Poverty}) + \beta_4(\text{No\_Siblings}) + \beta_5(\text{Age}) + \beta_6(\text{Male}) + \beta_7(\text{White}) + \mu$$

$$\text{Ln(Income)} = \alpha + \beta_1(\text{Adopted}) + \beta_2(\text{HGC\_Mother}) + \beta_3(\text{Poverty}) + \beta_4(\text{No\_Siblings}) + \beta_5(\text{Age}) + \beta_6(\text{Male}) + \beta_7(\text{White}) + \beta_8(\text{Education}) + \mu$$

Highest grade completed by the respondent's mother is the measure of socioeconomic status and family resources. Shelly Lundberg and Robert Pollak (2007) note that people tend to mate with those of similar education levels and background. Therefore, including only the mother's education is necessary because it will be strongly correlated with the fathers. Unfortunately, the NLSY does not provide a variable citing family income when the child was growing up in his or her parents' homes. Since education will strongly affect income, it will have to serve as a proxy for the resources available for investment in the child's human capital. Mother's education will be one of the major measures of the Family Background Effect.

Also, in an attempt to gain an understanding of the economic environment in which the child was raised, I will include whether or not they lived in poverty in 1978. This will be a good measure to see if there are any excess resources available in the family to invest in education and other activities to better a child's human capital accumulation. This is not a perfect measure, but it does provide some insight as to the financial situation of the family.

However, Bachrach (1983) finds that adopted children tend to have smaller families than those made up of biological children. Scarr and Weinberg

(1978) find that a smaller family size leads to higher performance on IQ tests. While this result is more correlated with families made up of biological children, it is important to include. Plus, having fewer children allows parents to make more resources available for each individual child.

As with a majority of studies completed measuring educational attainment and income earned, it is important to control for major demographic information. Therefore, I include race, gender, and age in my regression analysis.

As a second step in the analysis, I will remove the adoption dependent variable from the above regressions for education and income. Instead I will separate my samples into adopted children and biologically raised children and will run both regressions twice. This will allow me to understand the differences in the strength of each variable's effect on the different groups of young adults.

IV. Results

First, it is important to gain a general understanding of whether or not adoption is significant in predicting the outcome for young adults so some preliminary results were obtained. Both the highest grade completed and the natural log of income were regressed against the dummy variable of adopted by age two. As seen in Table 2, adoption was significant in predicting both outcome measures on the .1 level. Thus, at least preliminary results suggest that there is a difference between the outcomes of biologically raised and adopted young adults. It is important to note that both adoption coefficients are positive, thus signaling that adoption has a positive effect on education and the log of income respectively.

Then the linear regression technique was again used for both predictors of outcome while controlling for family background characteristics and general demographic information. The most important finding from these sets of regressions presented in Table 3 is that the adoption dummy variable is no longer significant. This signifies that the family background controls are capturing the explanations for the differences in attainment between biologically raised and adopted children as young adults. In other words, having mother's education, family's poverty status in 1978, and number of siblings in the regression control for the Family Background Effect. This leaves the adopted dummy variable to pick up the Adoption Effect. Since that adopted dummy variable is insignificant, the Adoption Effect does not affect this sample of adopted children.

Table 2: Predictions with only 'Adopted' as the Independent Variable

Dependent Variable	Adoption Coefficient	T-Statistic	R Squared	Sample Size
Highest Grade Completed	.491	1.857*	0	8634
Ln(Income)	.270	2.213**	.001	6886

*denotes significance at the .10 level
**denotes significance at the .05 level
***denotes significance at the .01 level

Table 3: Regression Results for Entire Sample

	Highest Grade Completed	Ln(Income)
Adopted	-.030 (-.118)	.305 (.301)
Highest Grade Completed by Mother	.257*** (30.455)	.035 (.301)
Family in Poverty in 1978	-.383*** (-5.889)	-.190*** (-6.079)
Number of Siblings	-.099*** (-9.198)	-.012** (-2.363)
Age	.024** (2.100)	.010** (1.983)
White	.125** (2.230)	.175*** (6.670)
Male	-.221*** (-4.396)	.541*** (23.003)
Highest Grade Completed	N/A	.125*** (23.239)
Sample Size	7582	6095
R Squared	.186	.191

The values in parentheses are absolute t-statistics
*denotes significance at the .10 level
**denotes significance at the .05 level
***denotes significance at the .01 level

In the regression estimating highest grade completed, all of the family background control variables behaved as expected and were highly significant. The highest grade completed by the mother is a measure of the importance of education in the home as well as a measure of socioeconomic status as education leads to a greater opportunity for a high income. The coefficient means that for every additional year of education the young adult's mother has causes the young adult to have an additional .257 years of education. The poverty status of the family in 1978 is the best measure of financial resources available to invest when the young adult was a child. If the family was in poverty in 1978, it would have had few

resources available to invest in education and other human capital inputs which explains the negative and significant coefficients in both the education and the income regression.

It is hypothesized that more siblings would translate into less human capital inputs as parents must allocate their total resources between their children. Economically, more children would create smaller pieces of the pie for the total amount of time and financial resources a parent can to give to each child. Theoretically, this division would translate into less time and resource inputs going to each child and should result in lover educational attainment. The lower amount of inputs would also transfer to less productivity and thus less income. This hypothesis spurred by Becker and Tomas (1986) is proven correct in both regressions by number of siblings having a negative and significant coefficient.

All of the control variables are also significant. Both the age and race variable act the same in the income and education regression in that their direction is consistent. The positive coefficient on the age variable means that the older the person, the higher his or her education level, and the higher his or her income. This makes very clear, intuitive sense. Also, the positive coefficient on the dummy variable for race shows that white people tend to achieve higher levels of education and income. The most unusual result from the control variables is that the coefficient for males is different for the education and income regression. It shows that males usually have less education than females but earn more income. This could be explained by a number of societal preferences and stigmas. It is now common knowledge that more women are attending college than males, but males earn more money (Lenhrer, 2002).

It is important to note that these results of the Family Background Effect prevailing over the Adoption Effect do not contradict all previous research. Celia Beckett (2007) finds in a study of children adopted from Romania that the problems faced from abandonment and poor institutionalized care are not ongoing. The problems only show up in the first few months of being in the adopted home. If the outcomes for the young adults in the NLSY sample follow the outcome of those in the Beckett study, then the young adults should not be negatively affected by what I titled the Adoption Effect. Her results, however, only attribute one sixth of a child's outcome to parental variable. This conclusion is not consistent with the results of this study as family variables explain most of the variation.

There was also a study completed by Monica Dalen (2006) that solicited teachers' evaluations of adopted children from China. The teachers did not report any major differences from domestically born children in their language ability. While the Dalen study was of young children, it adds some explanation of the lack of significance in adoption on educational attainment after controlling for family background. The possible negative effects on development that I have been predicting to be caused by the Adoption Effect did not impact the NLSY sample just as it did not have a sizable influence on the Dalen sample.

Next, in order to compare the different sizes of the effects family background measures, the sample was split between adopted and biologically raised young adults. These results, presented in Tables 4 and 5 on the following page, are much harder to interpret as there are differences in the sizes and direction of the effects on education.

The education level of the mother had the same effect on both adopted and biologically raised children in regards to their educational attainment. In fact, for biologically raised children, an additional year of the mother's education has about the same effect on the education obtained by the two groups. As hypothesized and consistent with the regression of the mixed sample presented in Table 3, the level of education completed by the mother has a positive effect which is also very significant on the educational attainment for her children. Oddly though, it does not have a significant effect on the income earned by her children.

If the family was in poverty in 1978, there was a negative effect on the educational attainment and income of the young adult. In predicting the highest grade completed, the effect of poverty status had a much larger effect on adopted children; however, the result for adopted children is not as significant for biologically raised children. The result for adopted children's education is significant only at the .1 level and it is not significant in predicting income. When measuring educational attainment, the effect of poverty status is smaller for biologically raised young adults than the entire sample. This discrepancy is most likely caused by the dramatic size difference of respondents between the two samples.

Table 4: Highest Grade Completed: Split Sample

	Adopted	Biological Raised
Highest Grade Completed by Mother	.260*** (3.211)	.258*** (30.226)
Family in Poverty in 1978	-1.367* (-1.683)	-.190*** (-6.079)
Number of Siblings	.232** (1.910)	-.099** (-9.137)
Age	.161 (1.644)	.024** (1.983)
White	-.515 (-.747)	.143** (2.526)
Male	.129 (.276)	-.224*** (-4.409)
Sample Size	75	7421
R Squared	.224	.191

The values in parentheses are absolute t-statistics
*denotes significance at the .10 level
**denotes significance at the .05 level
***denotes significance at the .01 level

Table 5: Wages and Salaries: Split Sample

	Adopted	Biological Raised
Highest Grade Completed by Mother	.039 (.883)	.002 (.578)
Family in Poverty in 1978	-.149 (-.325)	-.191*** (-6.103)
Number of Siblings	.017 (.204)	-.012** (-2.362)
Age	.069 (1.346)	.010* (1.934)
White	.617 (1.616)	.172*** (6.513)
Male	.613** (2.443)	.541*** (22.867)
Highest Grade Completed	.009 (1.651)	.125*** (23.166)
Sample Size	62	6032
R Squared	.393	.190

The values in parentheses are absolute t-statistics
*denotes significance at the .10 level
**denotes significance at the .05 level
***denotes significance at the .01 level

The last Family Background Effect measure, number of siblings, has opposite signs for the education measure for both adopted and biologically raised young adults and both results are highly significant. One possible explanation is that families that choose to adopt have more income and considerably less children as shown in Table 1. It is feasible that nearly all families that choose to adopt have enough resources to properly invest in the human capital of their children or they would not have chosen to adopt. There is not a large need to divide resources in a way that is harmful to the development of children. Therefore, a sibling might be beneficial to adopted children because they can learn more about proper interactions with other people, which Corcoran *et al* (1976) noted was important in determining outcomes for young adults. It should be noted that the positive sign on the coefficient for number of children in the adopted young adult's income measure was not significant. Again, the regression for the natural log of income presented in Table V, produced insignificant results.

None of the control variables in the regression predicting educational attainment for adopted children were significant. In fact, race and gender had opposite signs from the combined regression and the regression with biologically raised children. The signs were the same in predicting income as they were for the combined sample regression. Being of the male sex was the only significant control variable for predicting income in the adopted sample, and it has a positive effect on income. All of the control variables were significant on at least the .1 level for the biologically raised sample.

V. Conclusion

The results of this study indicate that adoption does not significantly affect the outcome of young adults when family background effects are controlled. Even though adoption has always been a supported practice, there have been a number of studies that show that the children are still at a greater disadvantage than they would be if they were biologically related to their parents. A number of studies, such as the Texas Adoption Project that measured IQ, conclude that biology has the largest impact in determining intelligence (Horn, 1983). However, using educational attainment and income earned, this study shows that the findings from a number of previous studies, especially those which measured IQ, are in fact opposite. Instead, the family characteristics are the biggest determinants in the outcomes of children, whether or not they are biologically raised. We can assume that the family is able to encourage the best application of children's natural intelligence through proper accumulation of human capital. This a major push for the direction of nurture over nature in the everlasting debate between the two.

Parents that have the ability to invest more in their children's human capital will see the results in higher levels of educational attainment and higher income for their children. Their ability to invest in their children's human capital, titled the Family Background Effect in this paper outweighs the Adoption Effect. Again, the Adoption Effect captured the possible negative effects of being adopted such as poor pre and post birth care and psychological damage. The Adoption Effect might have been stronger if the sample in this study was not limited to children adopted before the age of two. Examining the effects of different ages at which children are adopted could be an avenue in which to expand upon this study.

The measures of the Family Background Effect are not perfect. It is impossible to measure the entire effect and this study was limited by some variable selection. Mainly there is not a good way to measure the financial resources of the family. Instead, the mother's education and poverty level in 1978 had to serve as proxies. A good expansion of examining the competing effects would include data on the financial resources of the family. It is important to note, though, that realistically the Family Background Effect is controlled for in more ways than the three variables (mother's education, poverty status, and number of siblings) which are included in this study. In actuality, the selection process of adoption agencies is controlling for family background. Families must prove that they are stable and capable of taking care of children, something to which parents having biological children are not subjected.

It is important, then, that adoption agencies and the government consider the strength of the Family Background Effect when placing children in homes. They should take all steps necessary to insure that families have the ability and attitude that will give these children the best opportunity for achieving high levels of education since high levels of education and the resources of parents translate into higher earning for the young adults. With so many potential parents waiting to adopt in the United States, these agencies have the opportunity to be selective.

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