

**Parent Income-Based Gaps in Schooling, Earnings and Family Income: Cross-Cohort Trends in the NLSYs and the PSID**

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## **Parent Income-Based Gaps in Schooling, Earnings and Family Income: Cross-Cohort Trends in the NLSYs and the PSID**

### **Introduction and summary**

Several sources of evidence point to a growing gap in the achievement and school attainment of children growing up in high vs. low-income families (Reardon, 2011; Bailey and Dynarski, 2011; Duncan et al. 2014). Given the voluminous body of research linking labor market success with test scores and, especially, completed schooling (Card, 1999), one would expect that growing parental income-based gaps in completed schooling to translate into growing gaps in children's adult earnings and family income. Surprisingly, Chetty's (2014) recent analysis of tax files indicates that this does not appear to be the case.

We take a new look at this puzzle by investigating trends in the income-based gaps in completed schooling and early- and mid-career earnings and family income using data from the two cohorts of the National Longitudinal Survey of Youth (NLSY79 and NLSY97) as well as 31 birth cohorts from the Panel Study of Income Dynamics (PSID). Our procedures are detailed in an appendix.

We first generate consistent time-series information on the completed schooling and college graduation rates (by age 25) of children observed as adolescents in low and high income families (as defined by quintiles of single-year family income at ages 14, 15 or 16). Each of the 31 cohorts in the PSID contains about 200 children, so we use lowess procedures to smooth the lines in all of our figures and combine 6 cohorts centered on the starting years of the two NLSYs in the tables. Data from the PSID and the two NLSY cohorts are in close agreement in showing that gaps in both completed schooling and college graduation have grown (Figures 1 and 2 and Tables 1 and 2). Estimates from the NLSY are that the completed schooling gaps grew from 2.3 years in the NLSY79 to 2.9 years in the NLSY97, while gaps in college graduation rates increased from 31.5% to 45.4%. Gap growth in PSID data is similar, while the (admittedly imprecise) broader look at other cohorts in the PSID shows that the two NLSY cohorts span much of the period over which gap growth occurred.

Trends in early-career earnings and income are not as consistent in the two sources of data (Figures 3 and 4 and Table 3). Data in the figures are within-quintile means, while sensitivity to outliers led us to base estimates in the tables on within-quintile medians. PSID data in the figures and tables show growing absolute and proportionate gaps in both early career earnings and family income, while NLSY data show a very small positive change in the earnings gap and a small drop in the family income. PSID data also show a clear downturn in earnings and income for the most recent cohorts, who were age 25-28 in the midst of the Great Recession. We do not yet know the reason for the PSID/NLSY discrepancies. One possibility is that the NLSY incorporates immigrants while the PSID doesn't. But our appendix tables show that the exclusion of immigrants in the NLSYs has virtually no effect on the gap estimates. Another possibility is that our figures and tables might mix very different experience of men and women, but male-only data in Table 5 show that this is not the case.

Finally, we choose ages 36-39 as the period over which "mid-career" earnings and family income could be measured. Only the NLSY79 observes it sample at ages 36-39, while the PSID-

based figures smooth lines over only 18 of the 31 cohorts. In this case the results differ substantially across data sets and between estimates based on within-quintile means and medians. In the case of both earnings (Figure 5) and family income (Figure 6), the mean gaps appear to be increasing in the PSID. The NLSY79 produces mean gap estimates that are substantially smaller than PSID-based mean gap estimates in the figures for both earnings and family income. But the gaps based on within-quintile medians shown in Table 3 are smaller in the PSID than NLSY79. We will continue to investigate these discrepancies.

## References

- Bailey, M. and Dynarski, S. (2011). Inequality in Postsecondary Education. In G. Duncan and R. Murnane (Eds.). *Whither Opportunity: Rising Inequality, Schools, and Children's Life Chances*. New York: Russell Sage Foundation and Spencer Foundation.
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Table 1: Highest Grade Completed and College Completion by Age 25 in the NLSY79, NLSY97 and PSID

	Early cohorts				Later cohorts			
	Highest grade completed		Fraction completing college		Highest grade completed		Fraction completing college	
Single Year Total Family Income Quintile	NLSY79 – ages 14-16 in 1979	PSID – ages 14-16 in 1977-81	NLSY79 – ages 14-16 in 1979	PSID – ages 14-16 in 1977-81	NLSY97 – ages 14-16 in 1997	PSID – ages 14-16 in 1995-99	NLSY97 – ages 14-16 in 1997	PSID – ages 14-16 in 1995-99
1	11.670 (0.125)	11.956 (0.086)	0.062 (0.013)	0.023 (0.010)	12.080 (0.101)	12.266 (0.121)	0.082 (0.013)	0.086 (0.018)
2	11.830 (0.138)	12.097 (0.108)	0.056 (0.015)	0.078 (0.017)	12.749 (0.098)	13.048 (0.105)	0.167 (0.016)	0.148 (0.023)
3	12.466 (0.103)	12.554 (.0117)	0.119 (0.016)	0.116 (0.021)	13.576 (0.097)	13.375 (0.113)	0.263 (0.018)	0.213 (0.026)
4	12.904 (0.081)	13.401 (0.135)	0.156 (0.015)	0.254 (0.028)	14.189 (0.094)	14.473 (0.128)	0.389 (0.020)	0.469 (0.032)
5	13.934 (0.095)	13.977 (0.127)	0.377 (0.021)	0.358 (0.031)	14.997 (0.089)	14.998 (0.111)	0.536 (0.020)	0.591 (0.031)
Diff between top and bottom	2.264 (0.157)	2.021	0.315 (0.024)	0.335	2.917 (0.101)	2.732	0.454 (0.013)	0.505
Observations	3188	1,221	3188	1,221	3427	1,236	3427	1,236

Notes: Values are estimated means within each of the quintiles of family income with standard errors in parentheses. Dependent variable is based on reports at age 25. If missing age 25 values, age 26 values were used. Income data in NLSY79 and NLSY97 used single-year reports from 1979 and 1997 for total family income, respectively. PSID-based income is when the child is age 15, if that is not available age 14, and if that is not available age 16. NLSY estimates use the full samples and NLSY developed custom weights. PSID estimates are based on PSID-supplied sampling- and attrition-adjusted weights.

Table 2: Cross-Cohort Changes in Completed Schooling and College Completion in the NLSY79, NLSY97 and PSID  
 Note: all figures are based on Table 1

	Growth across cohorts			
	Completed Schooling		College Graduation	
Single Year Total Family Income Quintile	NLSY97 - NLSY79	PSID late 90s – PSID late 70s	NLSY79 – ages 14-16 in 1979	NLSY79 – ages 14-16 in 1979
1	0.410	0.310	0.020	0.063
2	0.919	0.951	0.111	0.070
3	1.110	0.821	0.144	0.097
4	1.285	1.072	0.233	0.215
5	1.063	1.021	0.159	0.233

Notes: Income data in NLSY79 and NLSY97 used single-year reports from 1979 and 1997 for total family income, respectively. PSID-based income is when the child is age 15, if that is not available age 14, and if that is not available age 16. NLSY estimates use the full samples and NLSY developed custom weights. PSID estimates are based on PSID-supplied sampling- and attrition-adjusted weights.

Table 3: Earnings and Family Income in Early and Mid-Career in the NLSY79, NLSY97 and PSID

	Early cohorts				Later cohorts				Early cohorts			
	Median early-career earnings (ages 25-28) in 10,000s of 2013\$		Median early-career family income (ages 25-28) in 10,000s of 2013\$		Median early-career earnings (ages 25-28) in 10,000s of 2013\$		Median early-career family income (ages 25-28) in 10,000s of 2013\$		Median mid-career earnings (ages 36-39) in 10,000s of 2013\$		Median mid-career family income (ages 36-39) in 10,000s of 2013\$	
Single Year Total Family Income Quintile	NLSY79 – ages 14-16 in 1979	PSID – ages 14-16 in 1977-1981	NLSY79 – ages 14-16 in 1979	PSID – ages 14-16 in 1977-1981	NLSY97 – ages 14-16 in 1997	PSID – ages 14-16 in 1995-1999	NLSY97 – ages 14-16 in 1997	PSID – ages 14-16 in 1995-1999	NLSY79 – ages 14-16 in 1979	PSID – ages 14-16 in 1977-1981	NLSY79 – ages 14-16 in 1979	PSID – ages 14-16 in 1977-1981
1	1.869 (0.138)	1.985 (0.147)	2.902 (0.188)	3.396 (0.201)	1.924 (0.135)	1.773 (0.114)	3.483 (0.193)	3.189 (0.155)	2.326 (0.181)	3.168 (0.179)	3.956 (0.434)	5.796 (0.361)
2	2.401 (0.142)	2.119 (0.117)	3.584 (0.174)	3.771 (0.174)	2.538 (0.094)	2.341 (0.211)	5.115 (0.020)	4.740 (0.250)	2.904 (0.164)	2.572 (0.183)	5.041 (0.401)	5.209 (0.428)
3	2.818 (0.091)	2.658 (0.129)	4.416 (0.171)	5.345 (0.263)	2.973 (0.091)	2.866 (0.187)	6.307 (0.245)	5.234 (0.234)	3.253 (0.151)	3.542 (0.253)	5.630 (0.275)	6.662 (0.353)
4	3.055 (0.105)	3.323 (0.143)	5.476 (0.194)	5.900 (0.245)	3.455 (0.111)	3.642 (0.198)	7.011 (0.190)	6.514 (0.248)	3.894 (0.162)	4.377 (0.817)	7.149 (0.309)	7.662 (0.712)
5	3.773 (0.110)	3.866 (0.157)	6.637 (0.157)	6.851 (0.375)	3.888 (0.110)	4.338 (0.198)	7.849 (0.198)	7.486 (0.394)	4.600 (0.213)	4.933 (0.721)	8.968 (0.293)	10.197 (0.911)
Diff between top and bottom	1.904	1.881	3.735	3.455	1.964	2.565	4.366	4.297	2.274	1.765	5.012	4.401
Diff between top and bottom of ln income	0.702	0.667	0.822	0.702	0.661	0.895	0.798	0.853	0.637	0.443	0.760	0.565
Observations	2802	1,145	2979	1,334	3159	1,108	3469	1,343	2424	756	2330	795

Notes: Values are estimated median of average annual earnings or family income by quintiles of family income with standard errors in parentheses. Dependent variable is the average of reported value at ages 25-28. Income data in NLSY79 and NLSY97 used single-year reports from 1979 and 1997 for total family income, respectively. PSID-based income is a PSID-based income is when the child is age 15, if that is not available age 14, and if that is not available age 16. NLSY estimates use the full samples and NLSY developed custom weights. PSID estimates are based on PSID-supplied sampling- and attrition-adjusted weights.

Table 4: Earnings and Family Income in Early and Mid-Career in the NLSY79, NLSY97 and PSID, Males Only

	Early cohorts				Later cohorts				Early cohorts			
	Median early-career earnings (ages 25-28) in 10,000s of 2013\$		Median early-career family income (ages 25-28) in 10,000s of 2013\$		Median early-career earnings (ages 25-28) in 10,000s of 2013\$		Median early-career family income (ages 25-28) in 10,000s of 2013\$		Median mid-career earnings (ages 36-39) in 10,000s of 2013\$		Median mid-career family income (ages 36-39) in 10,000s of 2013\$	
Single Year Total Family Income Quintile	NLSY79 – ages 14-16 in 1979	PSID – ages 14-16 in 1977-1981	NLSY79 – ages 14-16 in 1979	PSID – ages 14-16 in 1977-1981	NLSY97 – ages 14-16 in 1997	PSID – ages 14-16 in 1995-1999	NLSY97 – ages 14-16 in 1997	PSID – ages 14-16 in 1995-1999	NLSY79 – ages 14-16 in 1979	PSID – ages 14-16 in 1977-1981	NLSY79 – ages 14-16 in 1979	PSID – ages 14-16 in 1977-1981
1	2.256 (0.213)	2.991 (0.214)	2.917 (0.306)	4.034 (0.283)	2.378 (0.157)	2.624 (0.211)	3.721 (0.209)	3.138 (0.270)	2.720 (0.534)	3.323 (0.400)	4.20 (0.583)	6.801 (0.735)
2	2.680 (0.189)	2.740 (0.196)	3.481 (0.207)	3.771 (0.287)	2.887 (0.142)	3.169 (0.400)	5.101 (0.281)	4.820 (0.389)	3.175 (0.279)	3.185 (0.324)	5.267 (0.552)	6.409 (0.535)
3	3.167 (0.035)	3.555 (0.184)	4.463 (0.243)	5.578 (0.366)	3.210 (0.126)	3.749 (0.289)	5.879 (0.295)	5.362 (0.347)	3.887 (0.175)	4.117 (0.420)	5.529 (0.389)	6.193 (0.486)
4	3.546 (0.130)	3.944 (0.234)	5.492 (0.276)	6.411 (0.360)	4.022 (0.141)	4.134 (0.272)	7.005 (0.290)	6.281 (0.315)	5.156 (0.221)	5.817 (1.740)	7.809 (0.379)	7.273 (1.401)
5	4.560 (0.165)	4.521 (0.262)	6.640 (0.279)	6.726 (0.546)	4.167 (0.161)	4.883 (0.287)	7.036 (0.375)	6.374 (0.519)	6.454 (0.337)	6.902 (1.489)	9.095 (0.437)	9.906 (1.319)
Diff between top and bottom	2.304	1.530	3.723	2.692	1.789	2.259	3.315	3.236	3.734	3.579	4.895	3.105
Diff between top and bottom of ln income	0.703	0.413	0.774	0.511	0.558	0.621	0.627	0.709	0.682	0.731	0.692	0.376
Observations	1475	513	1494	635	1602	503	1727	659	1209	292	1159	316

Notes: Values are estimated median of average annual earnings or family income by quintiles of family income with standard errors in parentheses. Dependent variable is the average of reported value at ages 25-28. Income data in NLSY79 and NLSY97 used single-year reports from 1979 and 1997 for total family income, respectively. PSID-based income is a randomly-chosen single year when the child is age 14-16 between 1977 and 1981 PSID-based income is when the child is age 15, if that is not available age 14, and if that is not available age 16. NLSY estimates use the full samples and NLSY developed custom weights. PSID estimates are based on PSID-supplied sampling- and attrition-adjusted weights.



Table 5: Cross-Cohort Absolute and Proportionate Changes in Earnings and Family Income in Early and Mid-Career in the NLSY79, NLSY97 and PSID  
 Note: all figures are based on Table 3

	Growth across cohorts in dollars				Growth across cohorts in ln dollars			
	Earnings		Family Income		Log Earnings		Log Family Income	
Single Year Total Family Income Quintile	NLSY97 - NLSY79	PSID late 90s – PSID late 70s	NLSY97 - NLSY79	PSID late 90s – PSID late 70s	NLSY97 - NLSY79	PSID late 90s – PSID late 70s	NLSY97 - NLSY79	PSID late 90s – PSID late 70s
1	0.055	-0.212	0.581	-0.207	0.073	-0.113	0.197	0.107
2	0.137	0.222	1.531	0.969	0.055	0.100	0.344	0.422
3	0.155	0.208	1.891	-0.111	0.054	0.075	0.348	0.059
4	0.400	0.319	1.535	0.614	0.124	0.092	0.247	0.151
5	0.115	0.472	1.212	0.635	0.031	0.115	0.173	0.126

Notes: Income data in NLSY79 and NLSY97 used single-year reports from 1979 and 1997 for total family income, respectively. PSID-based income is when the child is age 15, if that is not available age 14, and if that is not available age 16. NLSY estimates use the full samples and NLSY developed custom weights. PSID estimates are based on PSID-supplied sampling- and attrition-adjusted weights.

Table 6: Life-Span Absolute and Proportionate Changes in Earnings And Family Income in Early and Mid-Career in the NLSY79, NLSY97 and PSID  
 Note: all figures are based on Table 3

	Growth from late 20s to late 30s in dollars				Growth from late 20s to late 30s in ln dollars			
	Earnings		Family Income		Log Earnings		Log Family Income	
Single Year Total Family Income Quintile	NLSY97 - NLSY79	PSID late 90s – PSID late 70s	NLSY79 – ages 14-16 in 1979	PSID late 90s – PSID late 70s	NLSY97 - NLSY79	PSID late 90s – PSID late 70s	NLSY79 – ages 14-16 in 1979	PSID late 90s – PSID late 70s
1	0.457	1.183	1.054	2.400	0.376	0.468	0.364	0.535
2	0.503	0.453	1.457	1.438	0.313	0.194	0.323	0.323
3	0.435	0.884	1.214	1.317	0.217	0.287	0.257	0.220
4	0.839	1.054	1.673	1.762	0.323	0.275	0.281	0.261
5	0.827	1.067	2.331	3.346	0.309	0.244	0.302	0.398

Notes: Income data in NLSY79 and NLSY97 used single-year reports from 1979 and 1997 for total family income, respectively. PSID-based income is a randomly-chosen single year when the child is age 14-16 between 1977 and 1981. PSID-based income is when the child is age 15, if that is not available age 14, and if that is not available age 16. NLSY estimates use the full samples and NLSY developed custom weights. PSID estimates are based on PSID-supplied sampling- and attrition-adjusted weights.

Table 7: School enrollment, marriage and cohabitation in the NLSY79, NLSY97 and PSID

	Early cohorts				Later cohorts				Early cohorts			
	Enrolled at age 26 (27)		Married at age 26 (27)		Enrolled at age 26 (27)		Married at age 26 (27)		Enrolled at age 37 (38)		Married at age 37 (38)	
Single Year Total Family Income Quintile	NLSY79 – ages 14-16 in 1979	PSID – ages 14-16 in 1977-1981	NLSY79 – ages 14-16 in 1979	NLSY79 – ages 14-16 in 1979	NLSY79 – ages 14-16 in 1979	NLSY79 – ages 14-16 in 1979	NLSY97 – ages 14-16 in 1997	PSID – ages 14-16 in 1995-1999	NLSY79 – ages 14-16 in 1979	PSID – ages 14-16 in 1977-1981	NLSY79 – ages 14-16 in 1979	PSID – ages 14-16 in 1995-1999
1	0.065 (0.016)		0.370 (0.028)		0.165 (0.015)		0.262 (0.020)		0.036 (0.015)		0.347 (0.032)	
2	0.105 (0.020)		0.412 (0.029)		0.205 (0.016)		0.322 (0.019)		0.023 (0.009)		0.529 (0.035)	
3	0.066 (0.012)		0.405 (0.024)		0.254 (0.017)		0.334 (0.020)		0.033 (0.010)		0.529 (0.027)	
4	0.071 (0.011)		0.540 (0.020)		0.255 (0.016)		0.381 (0.019)		0.021 (0.006)		0.624 (0.021)	
5	0.103 (0.013)		0.533 (0.021)		0.303 (0.017)		0.355 (0.019)		0.036 (0.008)		0.701 (0.021)	
Diff between top and bottom	0.038 (0.016)		0.163 (0.035)		0.138 (0.023)		0.093 (0.027)		0.000 (0.018)		0.354 (0.038)	
Observations	3066		3067		3956		3449		2376		2375	

Notes: Dependent variable is the average of reported value at age 26 or, if unavailable, age 27. Income data in NLSY79 and NLSY97 used single-year reports from 1979 and 1997 for total family income, respectively. PSID-based income is when the child is age 15, if that is not available age 14, and if that is not available age 16. NLSY estimates use the full samples and NLSY developed custom weights. PSID estimates are based on PSID-supplied sampling- and attrition-adjusted weights.

Table 8: Earnings (conditional on non-enrollment) and Family Income (conditional on marriage/two adult earnings) in Early and Mid-Career in the NLSY79, NLSY97 and PSID

	Early cohorts				Later cohorts				Early cohorts			
	Median early-career earnings conditional on non-enrollment (ages 25-28) in 10,000s of 2013\$		Median early-career family income conditional on marriage (ages 25-28) in 10,000s of 2013\$		Median early-career earnings conditional on non-enrollment (ages 25-28) in 10,000s of 2013\$		Median early-career family income conditional on marriage (ages 25-28) in 10,000s of 2013\$		Median mid-career earnings conditional on non-enrollment (ages 36-39) in 10,000s of 2013\$		Median mid-career family income conditional on marriage (ages 36-39) in 10,000s of 2013\$	
Single Year Total Family Income Quintile	NLSY79 – ages 14-16 in 1979	PSID – ages 14-16 in 1977-1981	NLSY79 – ages 14-16 in 1979	PSID – ages 14-16 in 1977-1981	NLSY97 – ages 14-16 in 1997	PSID – ages 14-16 in 1995-1999	NLSY97 – ages 14-16 in 1997	PSID – ages 14-16 in 1995-1999	NLSY79 – ages 14-16 in 1979	PSID – ages 14-16 in 1977-1981	NLSY79 – ages 14-16 in 1979	PSID – ages 14-16 in 1977-1981
1	1.955 (0.145)		4.636 (0.503)		1.853 (0.148)		4.812 (0.479)		2.324 (0.179)		6.216 (0.743)	
2	2.441 (0.160)		4.54 (0.421)		2.528 (0.099)		6.461 (0.317)		2.874 (0.176)		7.372 (0.351)	
3	2.820 (0.092)		5.510 (0.265)		3.011 (0.077)		7.336 (0.332)		3.253 (0.164)		7.508 (0.331)	
4	3.062 (0.114)		6.529 (0.198)		3.518 (0.131)		7.461 (0.286)		3.960 (0.185)		9.264 (0.355)	
5	3.8095 (0.112)		7.527 (0.226)		3.980 (0.126)		9.219 (0.381)		4.620 (0.213)		10.381 (0.417)	
Diff between top and bottom	1.8545		2.891		2.127		4.407		2.296		4.165	
Diff between top and bottom of ln income	0.667		0.485		0.737		0.650		0.637		0.515	
Observations	2553		1273		2700		929		2241		1179	

Notes: Values are estimated median average annual earnings or family income by quintiles of family income with standard errors in parentheses. Dependent variable is the average of reported value at ages 25-28. Income data in NLSY79 and NLSY97 used single-year reports from 1979 and 1997 for total family income, respectively. PSID-based income is when the child is age 15, if that is not available age 14, and if that is not available age 16. NLSY estimates use the full samples and NLSY developed custom weights. PSID estimates are based on PSID-supplied sampling- and attrition-adjusted weights.

## Appendix

### PSID Data

We use data spanning 31 cohorts born between 1954 and 1985 from the Panel Study of Income Dynamics (PSID; <http://psidonline.isr.umich.edu>). The PSID has followed a nationally representative sample of families and their children from 1968 through 2011. We identified 13,312 respondents age 15 (or age 14 if age 15 not available, or age 16 if age 14 and 15 not available) between 1978 and 1999 who had childhood income information. Our analysis sample consists of: (1) 7,336 respondents who were observed with non-missing data on completed schooling around age 25; (2) 6,454 respondents who were observed in the PSID between ages 14 and 16 and had non-missing data on earnings and 8,221 on family income between ages 25 and 28; and (3) 4,100 respondents who were observed in the PSID between ages 14 and 16 and had non-missing data on earnings and 4,344 on family income between ages 36 and 39. We adjust for differential non-response by using the PSID's attrition-adjusted weights in all of our analyses.

### *Childhood income*

We created two measure of annual household income when the child was 14-16 years old. For maximal comparability with the NLSY, we drew a single year measure of income when children were 14, 15 or 16. We used the PSID's high-quality edited measure of annual total family income (pre-tax), which includes taxable income and cash transfers to all household members. All incomes were inflated to 2013 levels using the U.S. consumer price index.

### *Completed education*

We focus our analysis on a continuous measure representing years of completed schooling reported at age 25 (which, given our cohorts, are calendar years 1978 through 2009). This measure has a value between one and 17, where one through 16 represents the highest grade or year of school completed. The PSID assigns a value of 17 for those who report at least some post-graduate work. We also use this completed schooling measure to define a dichotomous indicator of completing college (16+ years).<sup>1</sup>

### *Earnings and total family income*

We also generated data on earnings and total family income averaged across ages 25-28 for the entire sample as well as ages 36-39 for those 14-16 between 1968 and 1984. Earnings were gleaned from annual reports of wages and labor income. This measure was reported annually until 1997 when the PSID switched to a biannual survey and is only asked of heads of the household and their wives (legal wives and cohabitators). Other household members do not report earnings. Earnings are reported for the year prior to the survey year (e.g. 1990 earnings are reported in the 1991 survey). Family income was also asked annually, and between 1999 and 2003 the PSID asked respondents to report on the prior year income as well as the year before

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<sup>1</sup> Because the PSID switched to a biannual survey starting in 1997, for the even years 1998-2008 the year immediately previous or immediately following the year the respondent was 24 was used. Further, education values for heads and wives are not asked annually (as they are for other family members) because for adults it does not change quickly or commonly, so in some cases the most recent data available is also used. Periodically the PSID updates head/wife education, but in many cases earlier year education information is brought forward to the current year survey.

that. Starting with the 2005 survey, respondents only report on household income in the previous year (so no income is reported for anyone for 2003, 2005, 2007, or 2009). Total income includes all taxable income for all household members, as well as transfers. Earnings and family income are inflated to 2013 levels using the Consumer Price Index.

### **NLSY Data**

We use two different nationally representative cohorts of the U.S. National Longitudinal Study of Youth: i) a sample of 12,686 young men and women who were 14-22 years old when first surveyed in 1979 (NLSY79) and ii) a sample of 8,984 young men and women who were 12-18 years old when first surveyed in 1997 (NLSY97). Subjects were surveyed annually from 1979-1993 and biennially from 1994-2012 in the NLSY79 and annually from 1997-2011 in the NLSY97.

Our analysis sample consists of i) 4,078 respondents who were 14-16 years old in 1979 from the NLSY79 and ii) 5,454 respondents who were 14-16 years old in 1997 from the NLSY97. Our final analysis sample size ranges from 2,330 to 3,188 of the 4,078 from the NLSY79 and from 3,956 to 3,159 of the 5,454 from the NLSY97 based on our various outcomes of interest and non-missing values for base year total family income. We adjust for differential non-response and oversampling of different subgroups by using the NLSY's custom attrition-adjusted weights in all of our analyses.

### *Childhood income*

We drew a single year measure of income when children were 14, 15 or 16 in 1979 for the NLSY79 and in 1997 for the NLSY97. We used a study-created variable for total family income (pre-tax) in the base year, which includes taxable income, public assistance, and cash transfers to all household members. All incomes were inflated to 2013 levels using the U.S. consumer price index.

### *Completed education*

We focus our analysis on a continuous measure representing years of completed schooling reported at age 25 (calendar years 1988 through 1990 for NLSY79 and 2006 through 2008 for NLSY97). For cases where completed schooling is missing at age 25, completed at age 26 was used. This measure has a value between zero and 20. We also use this completed schooling measure to define a dichotomous indicator of completing college (16+ years).

Additionally, we assess enrollment in schooling at age 26. Subjects were asked of their enrollment status as of May 1 of the survey year in either high school or in college. Cases where subjects reported they were enrolled in any high school or in any college at age 26 were given a dichotomous indicator of enrollment. If enrollment information was missing at age 26, age 27 enrollment data was used.

### *Earnings and total family income*

In addition to our analysis on completed schooling, we also focus our analysis on earnings and total family income averaged across ages 25-28 in both the NLSY79 and the NLSY97 and across ages 36-39 in the NLSY79. Questions regarding earnings and income were asked annually between 1989 through 1991 for NLSY79 and 2007 through 2009 for NLSY97 when subjects

were age 25-28 and biennially between 2000 through 2004 for the NLSY79 when subjects were age 36-39. All earnings and income were inflated to 2013 levels using the U.S. consumer price index.

For earnings, subjects were asked “How much did you receive from wages, salary, commissions, or tips from all jobs, before deductions for taxes or anything else?” for both the NLSY79 and the NLSY97 for the calendar year before the interview date. The top 2% of values are truncated to the lowest value for the top 2% of cases in the NLSY97.

For total family income, we used a NLSY-created variable for total family income (pre-tax) which includes a subject's earnings, spousal earnings, public assistance, unemployment benefits, cash transfers, military earnings, and cash transfers, among others. A full description of the components of total family income can be found on the NLSY website.

### *Marital status*

Another interesting outcome that we assess and condition for is marital status at age 26 (calendar years 1989 through 1991 for NLSY79 and 2007 through 2009 for NLSY97). After being asked of their marital status, subjects were placed into one of three categories (never married; married, spouse present; other) in the NLSY79 and were placed into one of 5 categories (never married, married, separated, divorced, widowed) in the NLSY97. Married was a dichotomous indicator of "married, spouse present" in the NLSY79 and "married" in the NLSY97 at age 26. If marital status was missing at age 26, age 27 marital status was used.

## **PSID and NLSY Comparisons**

### *Completed education*

Table 1 presents the average highest grade completed and college completion rates for the NLSY79, NLSY97, and PSID for two time periods, late 1970s (early cohorts) and the late 1990s (later cohorts). The early cohort findings represent the 14-16 year olds in the NLSY79 and the 14-16 year olds in the PSID between 1977 and 1981, whereas the later cohorts are the 14-16 years olds in the NLSY97 and the 14-16 year olds in the PSID between 1995 and 1999. The average highest grade completed and college completion rates are shown for each of the income quintiles.

Several patterns emerge in the education comparison. First, while the gap in highest grade completed between the top and bottom income quintile is a bit larger (.2 years) in the NLSY79 and NLSY97 compared to its PSID counterparts, the gap grew between the two cohorts by about .7 years. Second, college completion rates are similar in the early cohorts (PSID 2 percentage points higher), with the PSID rates 5 percentage points higher in the later cohorts. However, this too grew between the two time periods for both datasets with the PSID sample experiencing a large increase.

Table 2 presents the cross-cohort changes in highest grade completed and college completion rates in the NLSY79, NLSY97, and PSID for each income quintile presented in Table 1. Column 1 illustrates the difference between the later cohort (NLSY97) and the early cohort (NLSY79) in highest grade completed for each level of the income distribution. Column 2

presents this for the two PSID cohorts from Table 1. Columns 3 and 4 present this information for college graduation rates.

Findings in Table 2 suggest that across the income distribution completed schooling and college graduation rates increased. For example, for the lowest income 14-16 year olds (quintile 1) years of completed schooling increased .410 years from 1979 to 1997 (column 1). Additionally, the largest increases in years of completed schooling were among those in the highest income quintiles. Note that among the highest income 14-16 year olds (quintile 5), years of completed schooling increased by over one year (1.063 for NLSY and 1.012 for PSID). Similar findings for college graduation are found, with increases across the distribution, but the largest increases found among the higher income.

### *Earnings and total family income*

Table 3 presents the median annual earnings and family income in early career (ages 25-28) and mid-career (ages 36-39) for the NLSY79, NLSY97, and PSID. The early-career descriptives are presented for both the early cohorts and the later cohorts, whereas the mid-career descriptives are only presented for the later cohorts (they have not yet reached these ages). Like previous tables, these are presented by the income quintile representing age 14-16 family income.

With respect to median early-career earnings, the difference between the lowest income children and highest income children in the early cohorts was about \$19,000 in annual earnings (columns 1 and 2, \$19,040 for the NLSY and \$18,810 for the PSID). This difference remains for the later cohorts of the NLSY, but increases for the later cohorts of the PSID (column 6, \$25,650).

Early-career family income differences between the lowest income and the highest income grew over time between the early and later cohorts in both datasets. The difference in 1979 was \$37,350 which grew to \$43,660 (growth in the difference of \$6,310); the difference for the 1977-1981 cohort grew from \$34,550 to \$42,970 (growth in the difference of \$8,420).

Finally, mid-career earnings and family income are presented for the later cohorts (ages 36-39). Findings suggest the difference between the lowest income and highest income is maintained from early-career. For example, the difference for the NLSY79 was \$19,040 and grew slightly to \$22,274 for the NLSY97. The PSID earnings gap is similar. The family income gap grew between the early and later cohorts.

Table 4 presents the same analysis as Table 3, but limited to males only. When compared to the figures presented in Table 3, a few differences emerge. First, the gap between the lowest and highest income adolescents in the early cohorts for early earnings is larger for the NLSY79 males versus the full sample, but smaller for the PSID males versus the full sample. Whereas these gaps were similar for the early NLSY and PSID cohorts among the full sample, for males the gap is much larger for the NLSY than the PSID. The gap in early-career family income for the early cohort in the NLSY mirrors the full sample, whereas the gap is smaller for males in the PSID than the full sample (meaning the gap for females is much larger). The early cohort mid-career earnings gap are larger for males than for the full-sample and similar in size for the two samples (NLSY97 and PSID 1995-1999). On the contrary, the gap for mid-career family income is smaller among males in both samples compared to the full sample, again suggesting that the



gap is much larger for females in family income. Among the later cohort of males, the early-career earning and family income gaps are smaller than the full sample.

Table 5 presents the cross-cohort changes in early-career earnings and family income for the NLSY79, NLSY97, and PSID. These figures are calculated from Table 3. The first two columns show the difference between the median early-career earnings by quintile between the NLSY79 and NLSY97 (column 1) and the PSID early and later cohorts (column 2). The PSID illustrates an increasing difference in early career earnings across the income distribution. For example, 14-16 year olds in the lowest income quintile in the early cohort (1977-1981) have higher early career earnings compared to the later cohort (1995-1999). However, moving through the income quintiles this reverses, and the early career earning of the 14-16 year olds in the highest income quintile the early cohort are lower by about \$4,720. This phenomenon is also found with early career family income for the NLSY samples.

Table 6 presents the life-span absolute and proportionate changes in earnings and family income between early- and mid-career. Whereas the previous table presented the difference in early-career earnings and family income, Table 6 presents the difference in early- and mid-career earnings and family income, thus examining trends in the life-span. For example column 1 presents the difference in earnings between the early cohort NLSY79 early-career earnings and the later cohort NLSY97 mid-career earnings. Columns 1 and 2 illustrate that earnings and income increase over the life-span, yet the extent of that increase differs depending on adolescent income. As seen in column 3, family income increases over the life-span universally, but the increases are larger among those with the highest income in adolescence and smaller among those with the lowest income in adolescence.

### **Comparisons with Bailey and Dynarski**

Some of our procedures and results differ from those presented in Bailey and Dynarski (BD) (2011), so we estimated how a series of our analysis design choices affected results. Issues that led to differences in procedures including: i) a desire to use an adolescent age range (14-16) in which virtually no adolescents were living apart from parents and contributing relatively little to family income; ii) a desire to use income quintiles rather than quartiles; iii) a worry that the NLSY's base weight was intended to adjust for differential sampling fractions associated with the military and poor white subsamples and yet BD excluded these groups from their analysis; we wanted to switch to the custom weights; iv) a worry that BD's use of survey and birth year to calculate child age produced stranger results than the child's report of his or her age at the time of the interview for the NLSY79; and v) a desire to use all of the data now available to NLSY analysts.

Results are shown in Appendix Table 1-4. We focus on Appendix Table 4 since it provides comparisons with one of the most frequently references dependent variable used in DB – rates of college graduation. Here is an accounting of the specifications in each column of the table:

BD Whither: This column uses the Stata code provided on Martha Bailey's website to generate an exact replication of Bailey and Dynarski using NLSY79 data from 1979-1990 and NLSY97 from 1997-2007 using children between ages of 15-18 in base year and quartiles of family income.

BD Whither Revised: Same as the first “BD Whither” column but with all available years of NLSY79 (1979-2012) and NLSY97 (1997-2011). BD Whither Revised and Models 1-4 use child age at interview instead of the difference between year of birth and survey year for NLSY79.

Model 1: Results based on quartiles of base year income between ages 14-16 using the Bailey and Dynarski exclusion criterion (no military subsample and no poor whites in supplemental NLSY79 sample, no children born outside of US, no children missing attainment data at either age 19 or at age 25) and base year weights.

Model 2: Same as Model 1 but using quintiles of base year income instead of quartiles of income and still using base year weights.

Model 3: Here we switch to quintiles of base year income between ages 14-16 with no excluded subsamples and use NLSY developed custom weights.

Model 4: An interest in seeing whether the inclusions of immigrants in the NLSY explained differences with the PSID led us to use quintiles of base year income between ages 14-16 for only the non-immigrant sample (children whose parents are born outside of the US or do not report parents’ place of birth excluded), and using NLSY developed custom weights. In the case of the NLSY97, our various adjustments to the quartile-based results (shown in the first three columns) produce very similar results to those in the DB chapter.

In the case of the NLSY79 results, adjusting the starting age from BD’s 15-18 to age 14-16 increases graduation rates considerably in the lowest quartile. As expected, moving from quartiles to quintiles increases the income-based gaps in both sets of NLSY cohorts. Our preferred estimates, estimated in columns labeled as “(3)”, are that college graduation rates *fell* slightly (and insignificantly) for the bottom quintile and rose by 14 percentage points for the top quintile.

Appendix Table 1: Comparisons with Bailey and Dynarski -- Highest Grade Completed (Age 25)

	NLSY79						NLSY97					
	BD Whither	BD Whither Revised	(1)	(2)	(3)	(4)	BD Whither	BD Whither Revised	(1)	(2)	(3)	(4)
Total Family Income (Age 14-16)												
1	11.835 (0.090)	12.170 (0.104)	11.885 (0.124)	11.895 (0.139)	11.670 (0.125)	11.679 (0.130)	11.773 (0.130)	11.814 (0.128)	12.217 (0.100)	12.098 (0.110)	12.080 (0.101)	12.090 (0.116)
2	12.571 (0.070)	12.456 (0.111)	12.181 (0.130)	11.923 (0.169)	11.830 (0.138)	11.827 (0.145)	12.882 (0.109)	12.802 (0.115)	13.131 (0.093)	12.863 (0.107)	12.749 (0.098)	12.668 (0.107)
3	12.956 (0.065)	13.112 (0.075)	12.826 (0.082)	12.524 (0.113)	12.466 (0.103)	12.448 (0.107)	13.733 (0.103)	13.768 (0.111)	14.016 (0.090)	13.656 (0.102)	13.576 (0.097)	13.596 (0.102)
4	13.932 (0.058)	14.022 (0.070)	13.774 (0.088)	12.950 (0.086)	12.904 (0.081)	12.903 (0.083)	15.005 (0.101)	14.921 (0.105)	15.027 (0.084)	14.291 (0.099)	14.189 (0.094)	14.172 (0.096)
5				13.950 (0.099)	13.934 (0.095)	13.886 (0.097)				15.085 (0.094)	14.997 (0.089)	15.004 (0.091)
Observations	3709	3709	2519	2519	3188	2944	2063	2246	3045	3045	3427	2971

Note:

Values are estimated means at each of the quartiles/quintiles of family income

Dependent variable was the reported value at age 25. If missing age 25 values, age 26 values were used.

Income data in NLSY79 and NLSY97 used single-year reports from 1979 and 1997 for total family income, respectively.

Immigrants defined as both parents born outside of the U.S.

Base year weights used for model 1 and 2. Custom weights created by NLSY accounting for nonresponse, subgroup, and inclusion of supplemental sample used for models 3 and 4.

BD Whither: Exact replication of Bailey and Dynarski using NLSY79 data from 1979-1990 and NLSY97 from 1997-2007 using kids between ages of 15-18 in base year

BD Whither Revised: Same as BD Whither but with all available years of NLSY79 (1979-2012) and NLSY97 (1997-2011). Child age at interview instead of the difference between year of birth and survey year for NLSY79

Model 1: Quartiles of base year income between ages 14-16 using Bailey and Dynarski exclusion criterion (no military subsample and no poor whites in supplemental NLSY79 sample, no children born outside of US, no children missing attainment data at either age 19 or at age 25) and base year weights

Model 2: Same as Model 1 but uses quintiles of base year income instead of quartiles of income and using base year weights

Model 3: Quintiles of base year income between ages 14-16 with full sample and using NLSY developed custom weights. These estimates are shown in Table 1.

Model 4: Quintiles of base year income between ages 14-16 for non-immigrant sample (children whose parents are born outside of the US or do not report parents' place of birth excluded) using NLSY developed custom weights

All models except for BD Whither use child age at interview instead of the difference between year of birth and survey year for NLSY79

Appendix Table 2: Comparisons with Bailey and Dynarski -- Graduate High School (Age 25)

Total Family Income (Age 14-16)	NLSY79				NLSY97			
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
1	0.741 (0.026)	0.744 (0.028)	0.693 (0.025)	0.704 (0.026)	0.771 (0.017)	0.761 (0.020)	0.762 (0.019)	0.767 (0.021)
2	0.793 (0.022)	0.750 (0.030)	0.733 (0.025)	0.732 (0.025)	0.888 (0.012)	0.855 (0.016)	0.844 (0.015)	0.838 (0.017)
3	0.893 (0.013)	0.835 (0.020)	0.819 (0.018)	0.820 (0.019)	0.943 (0.009)	0.931 (0.011)	0.924 (0.011)	0.931 (0.011)
4	0.938 (0.009)	0.918 (0.012)	0.909 (0.011)	0.912 (0.012)	0.980 (0.005)	0.950 (0.009)	0.949 (0.009)	0.950 (0.009)
5		0.941 (0.010)	0.940 (0.010)	0.938 (0.010)		0.983 (0.005)	0.983 (0.005)	0.987 (0.005)
Observations	2519	2519	3188	2944	3045	3045	3427	2971

Note:

Values are estimated means at each of the quartiles/quintiles of family income

Dependent variable was the reported value at age 25. If missing age 25 values, age 26 values were used.

Income data in NLSY79 and NLSY97 used single-year reports from 1979 and 1997 for total family income, respectively.

Immigrants defined as both parents born outside of the U.S.

Base year weights used for model 1 and 2. Custom weights created by NLSY accounting for nonresponse, subgroup, and inclusion of supplemental sample used for models 3 and 4.

Model 1: Quartiles of base year income between ages 14-16 using Bailey and Dynarski exclusion criterion (no military subsample and no poor whites in supplemental NLSY79 sample, no children born outside of US, no children missing attainment data at either age 19 or at age 25) and base year weights

Model 2: Same as Model 1 but uses quintiles of base year income instead of quartiles of income and base year weights

Model 3: Quintiles of base year income between ages 14-16 using full sample and NLSY developed custom weights

Model 4: Quintiles of base year income between ages 14-16 for non-immigrant sample (children whose parents are born outside of the US or do not report parents' place of birth excluded) NLSY developed custom weights

Appendix Table 3: Comparisons with Bailey and Dynarski --Attend College (Age 25)

Total Family Income (Age 14-16)	NLSY79				NLSY97			
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
1	0.230 (0.026)	0.233 (0.029)	0.222 (0.024)	0.215 (0.026)	0.312 (0.019)	0.295 (0.021)	0.290 (0.020)	0.283 (0.022)
2	0.290 (0.026)	0.232 (0.031)	0.226 (0.025)	0.223 (0.026)	0.446 (0.020)	0.408 (0.022)	0.392 (0.020)	0.372 (0.022)
3	0.374 (0.019)	0.335 (0.025)	0.323 (0.023)	0.318 (0.023)	0.616 (0.018)	0.539 (0.022)	0.526 (0.021)	0.522 (0.022)
4	0.552 (0.019)	0.400 (0.021)	0.393 (0.020)	0.390 (0.020)	0.789 (0.015)	0.668 (0.020)	0.649 (0.019)	0.646 (0.020)
5		0.583 (0.021)	0.580 (0.021)	0.571 (0.021)		0.795 (0.017)	0.781 (0.016)	0.785 (0.017)
	2519	2519	3188	2944	3045	3045	3427	2971

Note:

Values are estimated means at each of the quartiles/quintiles of family income

Dependent variable was the reported value at age 25. If missing age 25 values, age 26 values were used.

Income data in NLSY79 and NLSY97 used single-year reports from 1979 and 1997 for total family income, respectively.

Immigrants defined as both parents born outside of the U.S.

Base year weights used for model 1 and 2. Custom weights created by NLSY accounting for nonresponse, subgroup, and inclusion of supplemental sample used for models 3 and 4.

Model 1: Quartiles of base year income between ages 14-16 using Bailey and Dynarski exclusion criterion (no military subsample and no poor whites in supplemental NLSY79 sample, no children born outside of US, no children missing attainment data at either age 19 or at age 25) and base year weights

Model 2: Same as Model 1 but uses quintiles of base year income instead of quartiles of income and base year weights

Model 3: Quintiles of base year income between ages 14-16 using full sample and NLSY developed custom weights

Model 4: Quintiles of base year income between ages 14-16 for non-immigrant sample (children whose parents are born outside of the US or do not report parents' place of birth excluded) NLSY developed custom weights

Appendix Table 4: Comparisons with Bailey and Dynarski --Graduate College (Age 25)

Total Family Income (Age 14-16)	NLSY79						NLSY97					
	BD Whither	BD Whither Revised	(1)	(2)	(3)	(4)	BD Whither	BD Whither Revised	(1)	(2)	(3)	(4)
1	0.048 (0.009)	0.056 (0.012)	0.059 (0.014)	0.064 (0.016)	0.062 (0.013)	0.059 (0.014)	0.094 (0.013)	0.094 (0.015)	0.101 (0.013)	0.085 (0.014)	0.082 (0.013)	0.087 (0.014)
2	0.138 (0.013)	0.077 (0.013)	0.072 (0.016)	0.054 (0.019)	0.056 (0.015)	0.056 (0.016)	0.208 (0.017)	0.197 (0.019)	0.213 (0.017)	0.183 (0.018)	0.167 (0.016)	0.158 (0.017)
3	0.173 (0.015)	0.168 (0.013)	0.151 (0.014)	0.117 (0.018)	0.119 (0.016)	0.113 (0.017)	0.318 (0.018)	0.324 (0.020)	0.344 (0.018)	0.278 (0.020)	0.263 (0.018)	0.269 (0.019)
4	0.357 (0.017)	0.316 (0.015)	0.345 (0.019)	0.163 (0.016)	0.156 (0.015)	0.156 (0.015)	0.543 (0.019)	0.527 (0.022)	0.542 (0.019)	0.406 (0.021)	0.389 (0.020)	0.386 (0.020)
5				0.382 (0.021)	0.377 (0.021)	0.365 (0.021)				0.549 (0.021)	0.536 (0.020)	0.534 (0.021)
N	3709	3709	2519	2519	3188	2944	2063	2246	3045	3045	3427	2971

Note:

Values are estimated means at each of the quartiles/quintiles of family income

Dependent variable was the reported value at age 25. If missing age 25 values, age 26 values were used.

Income data in NLSY79 and NLSY97 used single-year reports from 1979 and 1997 for total family income, respectively.

Immigrants defined as both parents born outside of the U.S.

Base year weights used for model 1 and 2. Custom weights created by NLSY accounting for nonresponse, subgroup, and inclusion of supplemental sample used for models 3 and 4.

BD Whither: Exact replication of Bailey and Dynarski using NLSY79 data from 1979-1990 and NLSY97 from 1997-2007 using kids between ages of 15-18 in base year

BD Whither Revised: Exact replication of Bailey and Dynarski using NLSY79 data from 1979-2012 and NLSY97 from 1997-2011 using kids between ages of 15-18 in base year.

Child age at interview instead of the difference between year of birth and survey year for NLSY79

Model 1: Quartiles of base year income between ages 14-16 using Bailey and Dynarski exclusion criterion (no military subsample and no poor whites in supplemental NLSY79 sample, no children born outside of US, no children missing attainment data at either age 19 or at age 25) and base year weights

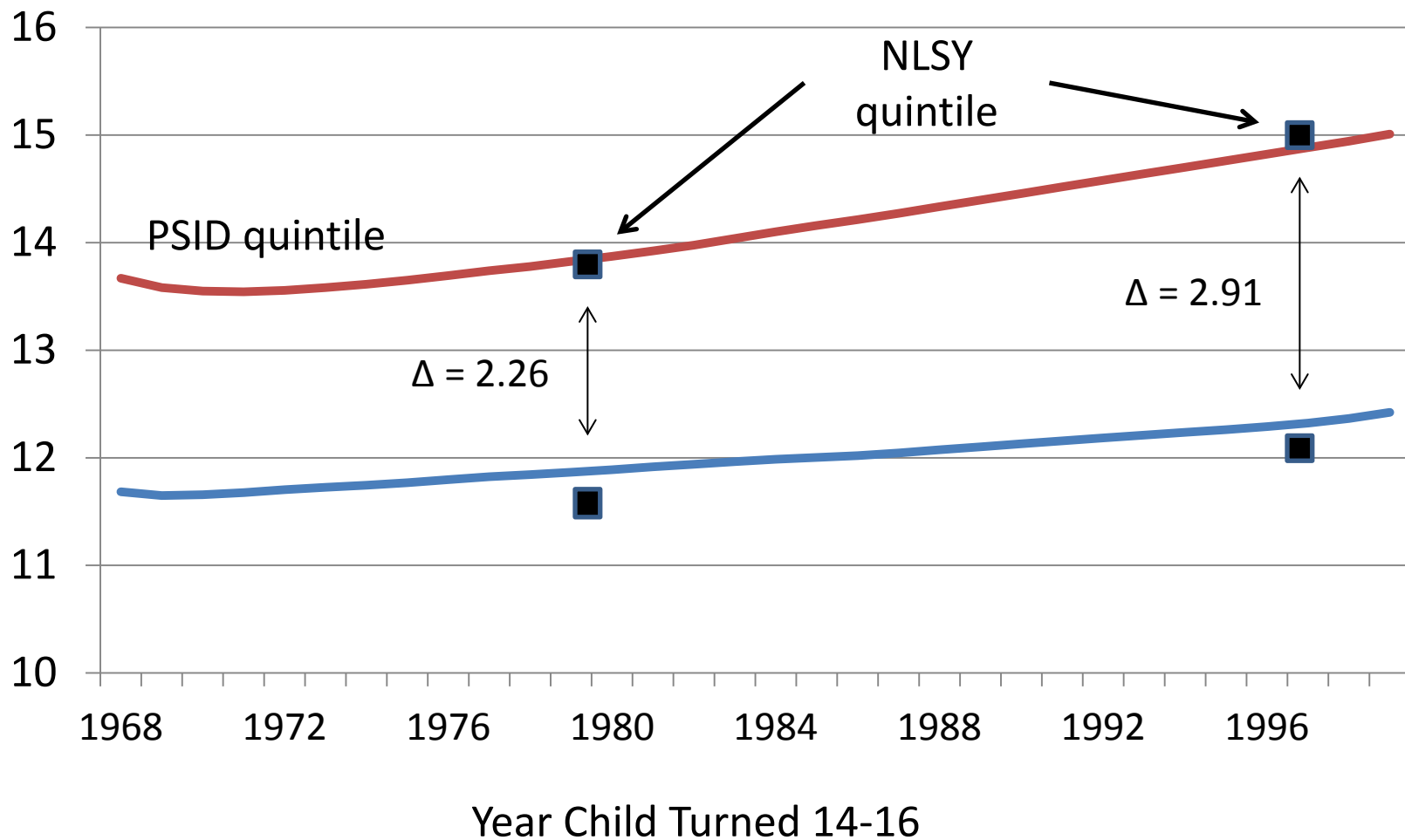
Model 2: Same as Model 1 but uses quintiles of base year income instead of quartiles of income and using base year weights

Model 3: Quintiles of base year income between ages 14-16 with full sample and using NLSY developed custom weights. These estimates are shown in Table 1.

Model 4: Quintiles of base year income between ages 14-16 for non-immigrant sample (children whose parents are born outside of the US or do not report parents' place of birth excluded) using NLSY developed custom weights

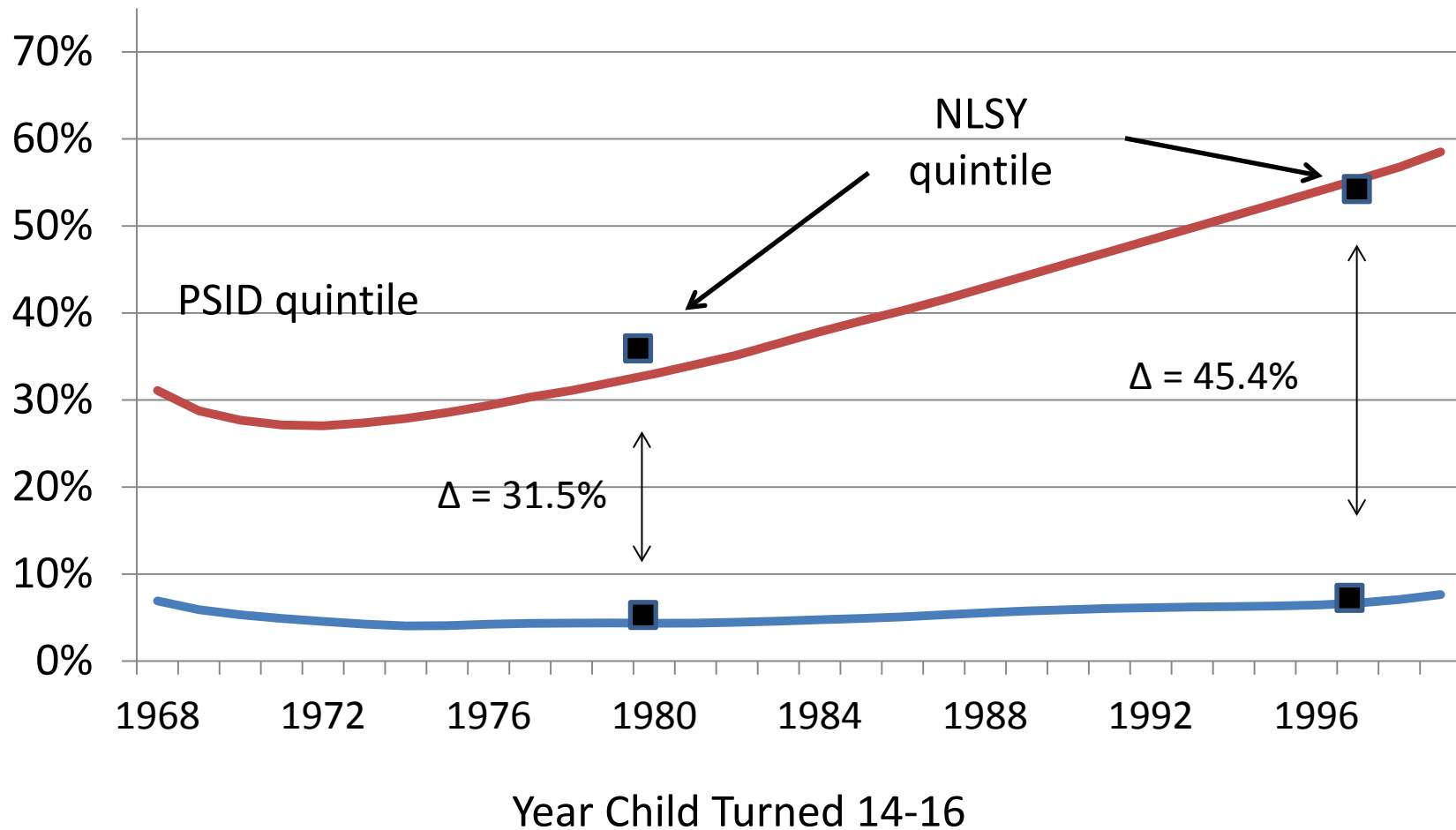
All models except for BD Whither use child age at interview instead of the difference between year of birth and survey year for NLSY79

# Figure 1: Years Completed Schooling at Age 25 for Top and Bottom Quintile Children



Source: PSID and NLSY

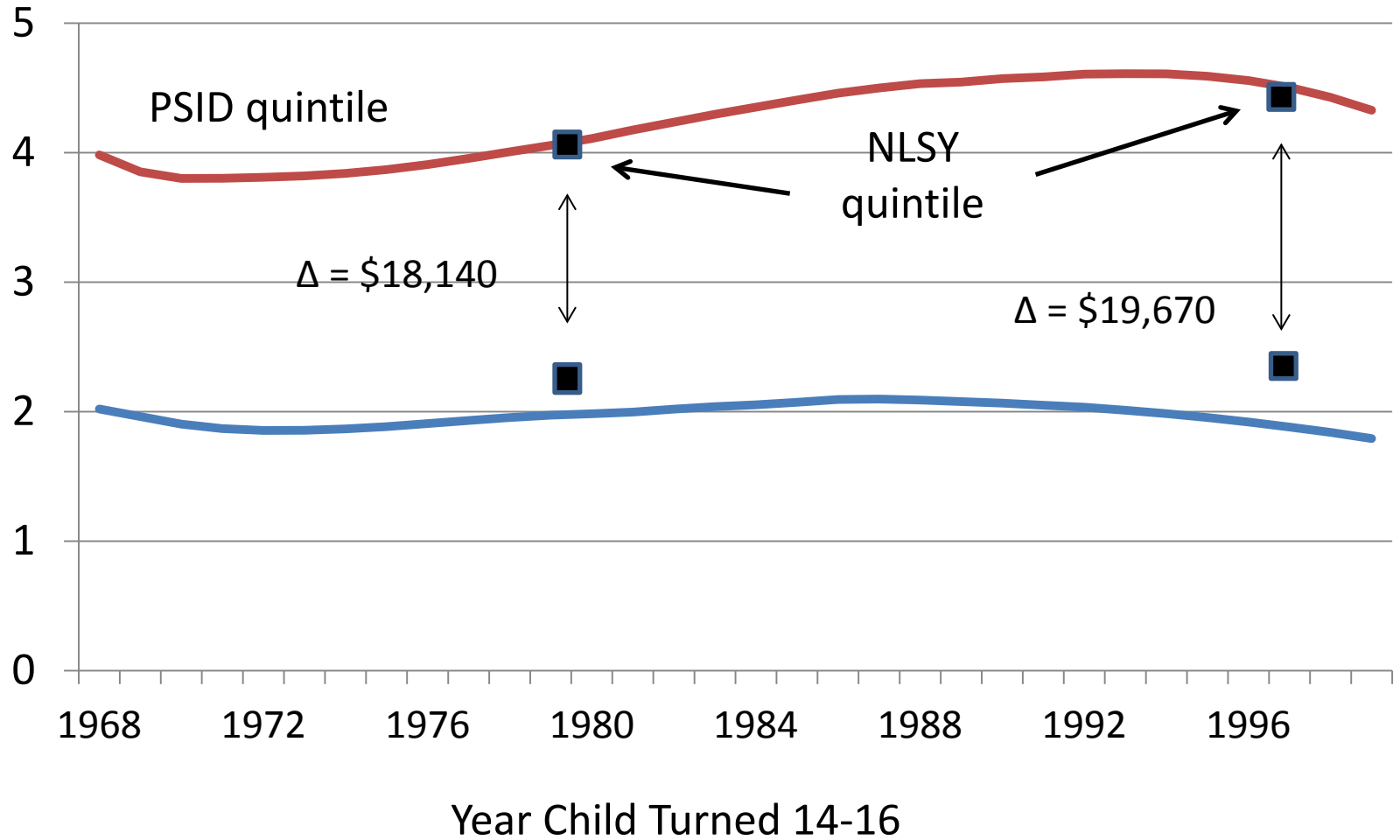
# Figure 2: College Graduation Rates by Age 25 for Top and Bottom Quintile Children



Source: PSID and NLSY

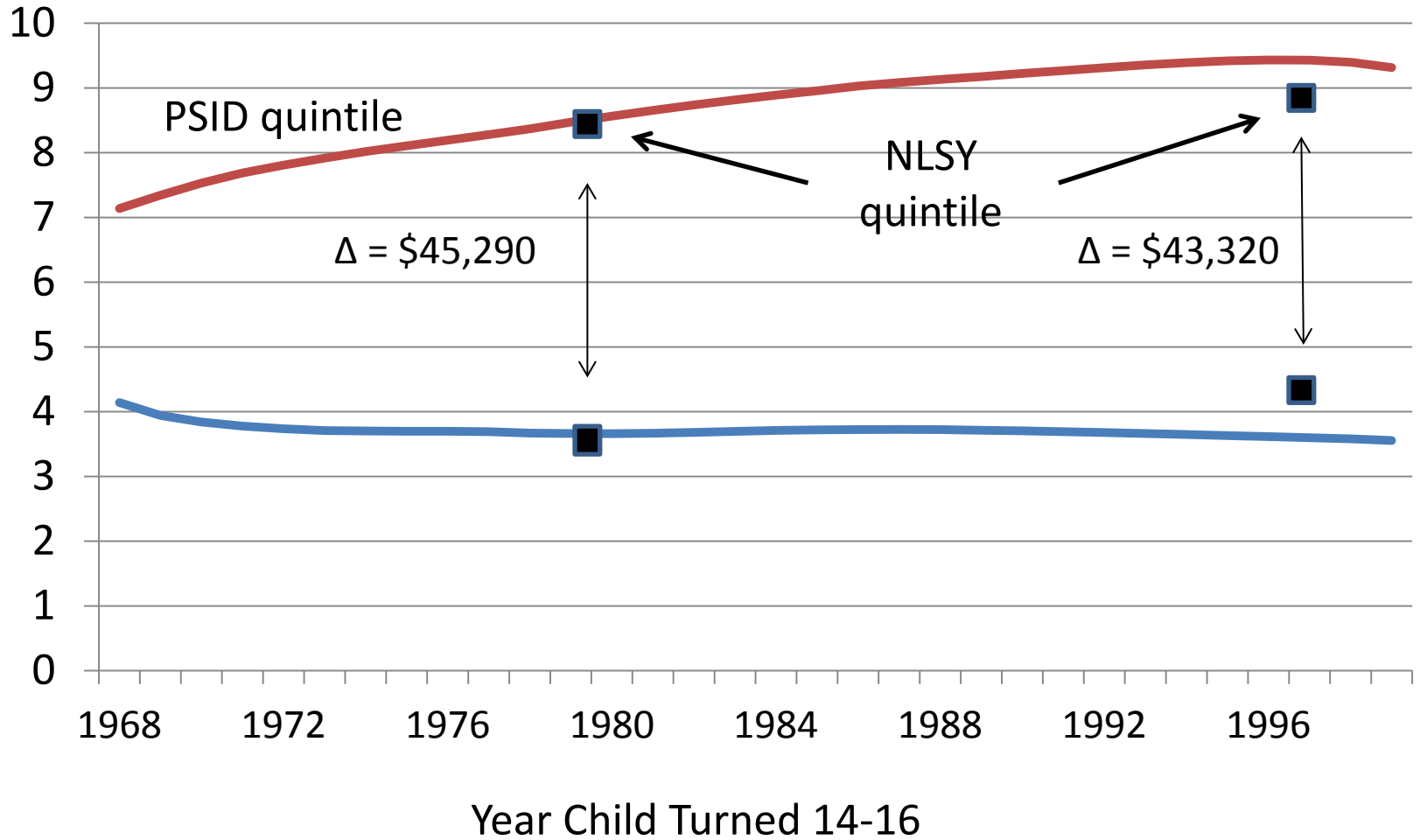


# Figure 3: Mean Earnings (in10K) Ages 25-28 for Top and Bottom Quintile Children



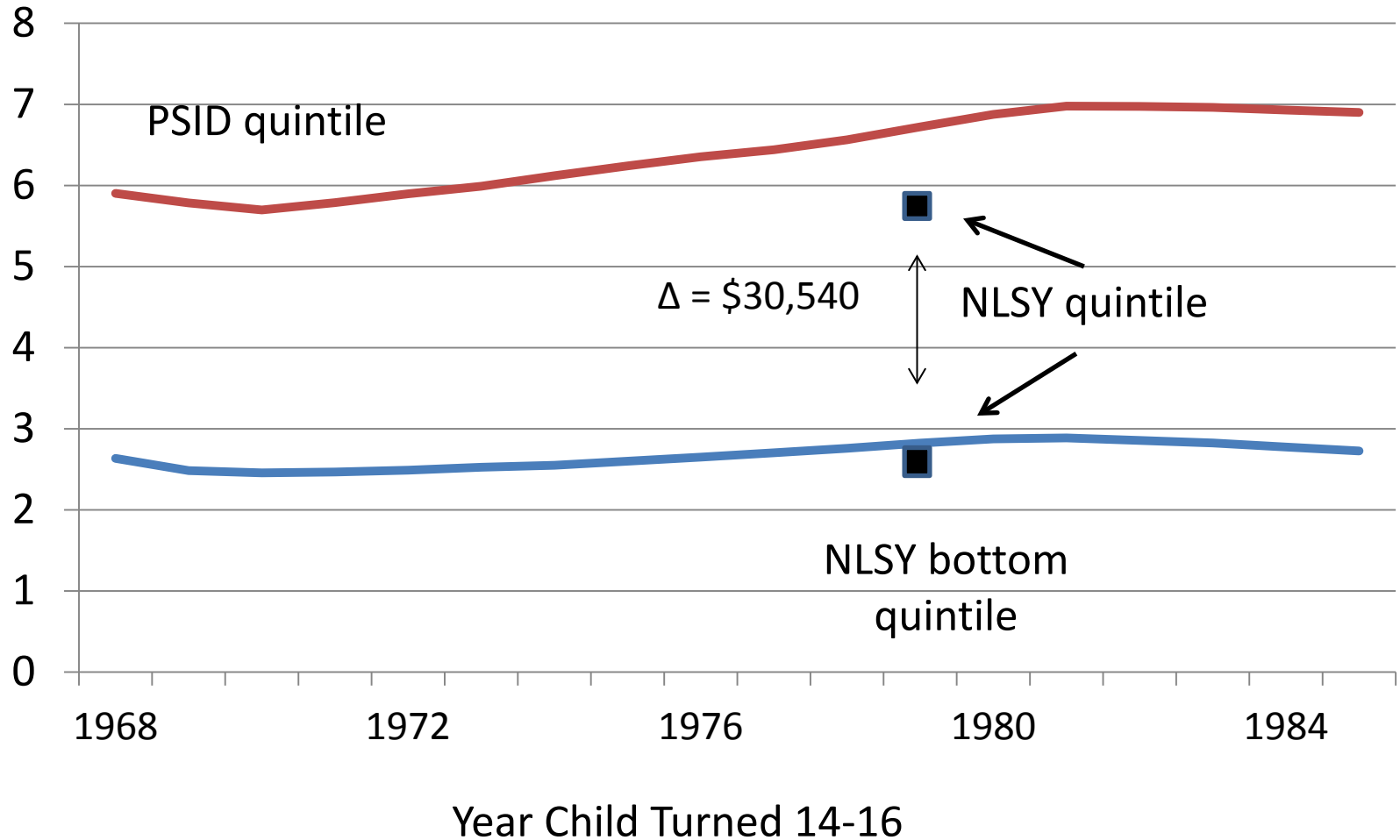
Source: PSID and NLSY

# Figure 4: Mean Family Income (10K) Ages 25-28 for Top and Bottom Quintile Children



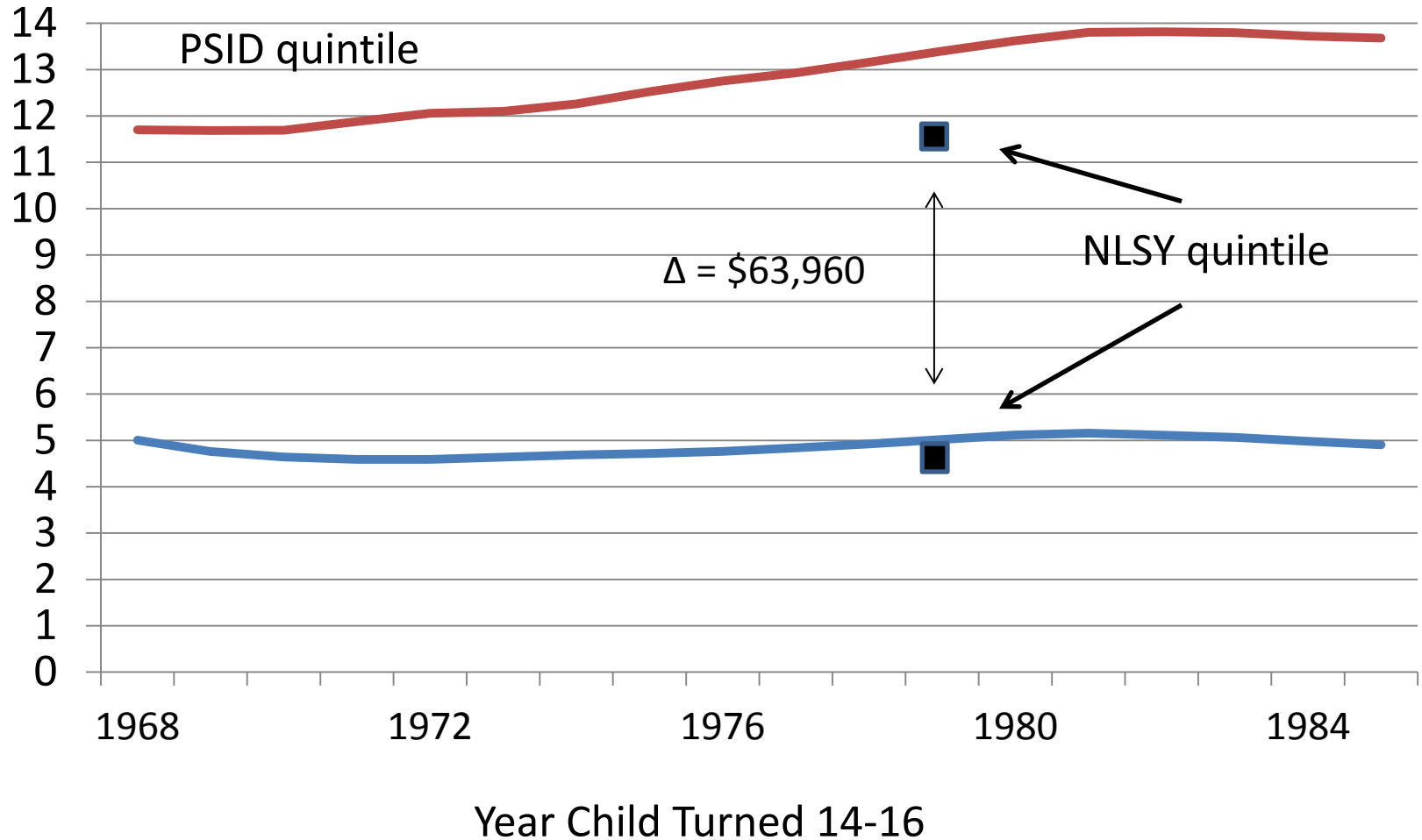
Source: PSID and NLSY

Figure 5: Mean Earnings (10K) Ages 36-39 for Top and Bottom Quintile Children (only 18 cohorts)



Source: PSID and NLSY

Figure 6: Mean Family Income (10K) Ages 36-39 for Top and Bottom Quintile Children (only 18 cohorts)



Source: PSID and NLSY