

IPR 40th Anniversary Conference

Changes in Inequality in the Education and Human Capital of American Youth

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Questions:

1. How does the level and distribution of education and human capital of young Americans compare with those who were young around 1980.

- Skill endowments of young Americans will determine their labor market outcomes far into the future.
- Supply of skills influence returns to skills and earnings inequality far into the future.

2. **What** Is Responsible for the Change **in Skills**?

- ◆ **Race/Ethnic mix?**
- ◆ **Parental Education?**
- ◆ **Family Structure?**
- ◆ **Growth in Cognitive Skills Given Education?**
 - Level and Distribution of School Quality
- ◆ **Other Factors**

□ *SYMBOL 61608 \f "Symbol" \s 10 \h* □ *Have people responded to the increase in the returns to skills observed since early 1980s?*

3. What will be the net effect of technical change and changes in the supply of skill on inequality in 2025?

(Talk draws on Altonji, Bharadwag and Lange (2008, 2009), Lange (2009))

Data Sets

We compare:

1. Persons aged 12 to 16 in 1997
National Longitudinal Survey of Youth, 1997
(NLSY97)
2. Persons aged 14 to 22 in 1979.
National Longitudinal Survey of Youth, 1979
(NLSY79).

Skill Correlates:

Race, Gender, Parental Education, Family Structure, Schooling, AFQT, and work transition variables.

Aggregating Skill Measures Using Wages

- ♦ We use a skill index to value changes in components of skill vector because:
 - Not all correlates have shown increases between 1979 and 1997.
 - Need to assess overall change in the distribution of skills.

- ♦ Wages as Skill Index:
 - Adult wages of 1979 cohort observed between 1998-2004.

 - Use a reweighting method.

Main Results:

1. Average increase of skill index of about 6 %.
2. Increases are larger for minorities and for females.
3. Widening of the skill distribution in population as a whole and within race/sex groups.
4. About 2/3 of the increase in skills can be linked to parental education measures.
5. Education choices have not responded very much to growth in the return to education
6. (HIGHLY SPECULATIVE) Demand for skilled workers will outstrip supply if current trends continue, leading to substantially more inequality in 2025

Overview of Methods

1. Identify skill indicators/determinants that are comparable across data sets.
2. Reweight 1979 sample to have the same distribution of characteristics as the 1997 sample (DiNardo, Fortin, and Lemieux , 1996).
3. Compare reweighted and original distribution of wages of 1979 adults.
4. Decompose changes into contributions of components of skill vector.
5. Supplement and compare with regression decompositions.

Using Adult Wages of 1979 Cohort to Measure Skills

- . Adult Wages are determined by sets of variables z and u .
- . z is observed; u is not.

Observed wages of 1979 cohort between 1998 – 2004
aggregate skill vectors (z,u) :

$$w = W^{79}(z,u).$$

Unobservable Skills

Assumption 1: Unobservables conditional on observables distribution similar for the 1979 and 1997 cohorts.

Only an approximation because:

- Changes in school quality, family/neighborhood environment, social promotion.
- Behavioral responses to changing (unobserved) skill prices between 1979 and 1997.

Given our assumption, weights that ‘equalize’ the distribution of observed characteristics across the cohorts also equalize the distribution of unobservable characteristics.

We use the wage structure of the economy in **1998-2004** to value the different skills.

Can do this using the observed wages in 1998-2004 from the NLSY79.

Later, discuss fact that the relative and absolute value of skills in 2025 will probably differ from that in 1998-2004.

Weighting

Reweight the 1979 sample so that it looks like the 1997 sample along the dimensions of race, gender, parental education, etc.

Applying the weights to the NLSY79 sample yields the counterfactual wage distribution.

Data Issues

- Construct skill measures using the waves up to the survey year when these individuals reach age 22.
- Draw on the work of Segall (2000) to put the NLSY97 test and the NLSY79 AFQT test on the same scale.
- Account for difference in the age when individuals take the test
- Adjust for attrition prior to age 22.

Results

Individual Skill Measures – Parental Education

Substantial increase in parental education:

- a. Just under 1 year for father's highest grade completed and about 1 year for mother's .
- b. Larger for minorities (for Blacks about +1.5 years for both mother and father's years of schooling).

	1979			1997		
	White	Black	Hispanic	White	Black	Hispanic
Father's HGC	12.4	10.6	9.6	13.4	12.3	10.5
Mother's HGC	12.1	11.0	9.1	13.2	12.4	10.7

Individual Skill Correlates – Parental Presence at Age 14

Dramatic decline in traditional family structure across all ethnic groups.

Only 25% of Black teenagers today live with both biological parents.

	1979			1997		
	White	Black	Hispanic	White	Black	Hispanic
Mother only	14.6%	38.3%	27.1%	30.3%	59.5%	35.2%
Father only	3.2%	2.8%	2.5%	6.5%	4.8%	4.4%
Both	80.2%	50.2%	65.5%	58.6%	25.3%	56.1%
Neither	2.0%	8.9%	4.9%	4.5%	10.3%	4.3%

Individual Skill Correlates – Education and AFQT

	1979					
	White		Black		Hispanic	
Gender:	M	F	M	F	M	F
AFQT	48.2	47.3	18.0	18.9	27.7	24.6
GED	5.9%	5.2%	8.1%	5.5%	8.9%	5.6%
HS Diploma	79.5%	83.0%	64.7%	73.8%	60.2%	64.4%
HGC \geq 14 at age 22	33.0%	34.6%	18.6%	25.4%	18.7%	19.1%
Enrolled at age 22	24.1%	19.0%	13.3%	16.3%	15.6%	15.5%

	1997					
	White		Black		Hispanic	
Gender:	M	F	M	F	M	F
AFQT	50.1	50.9	23.6	27.3	32.4	31.9
GED	8.1%	5.6%	12.9%	7.2%	6.5%	5.5%
HS Diploma	81.4%	84.7%	64.6%	79.0%	75.3%	77.9%
HGC \geq 14 at age 22	39.4%	51.6%	20.9%	33.7%	24.5%	34.0%
Enrolled at age 22	30.9%	34.9%	17.5%	27.9%	25.6%	24.1%

1. Schooling and AFQT generally increased more among minorities and females than among whites and males.

2. Increases in schooling uneven across distribution:

Share with HS diplomas (not GEDs) increases by about 1%.

Share of with 14+ years of education at age 22 increases from about 31 to about 40%.

3. Enrollment Rate at age 22 is up quite a bit, from 20% to 30%.

4. Much of the Improvement in Education Is Due to Parental Education

***Effect of Parental Education and Family Structure on Change
in Education, 1979 VS 1997***

	MALES					
	White Males		Black Males		Hispanic Males	
Gender:	Total □	□ due to Parent Ed, Fam Structure	Total □	□ due to Parent Ed, Fam Structure	Total □	□ due to Parent Ed, Fam Structure
HS Diploma	0.017	0.012	-0.028	0.035	0.174	0.072
Highest grade at age 22	0.315	0.365	0.041	0.041	0.764	0.454
HGC ≥ 14 at age 22	0.073	0.091	0.017	0.017	0.071	0.054
Enrolled at age 22	0.060	0.066	0.030	0.030	0.101	0.028

***Effect of Parental Education and Family Structure on Change
in Education, 1979 VS 1997***

	FEMALES					
	White Females		Black Females		Hispanic Females	
Gender:	Total □	□ due to Parent Ed, Fam Structure	Total □	□ due to Parent Ed, Fam Structure	Total □	□ due to Parent Ed, Fam Structure
HS Diploma	0.014	0.004	0.035	0.043	0.144	0.077
Highest grade at age 22	0.623	0.378	0.417	0.427	0.970	0.590
HGC \geq 14 at age 22	0.170	0.094	0.081	0.090	0.144	0.084
Enrolled at age 22	0.151	0.046	0.091	0.050	0.087	0.045

AFQT Test Scores Have Improved for Every Gender/Race Group.

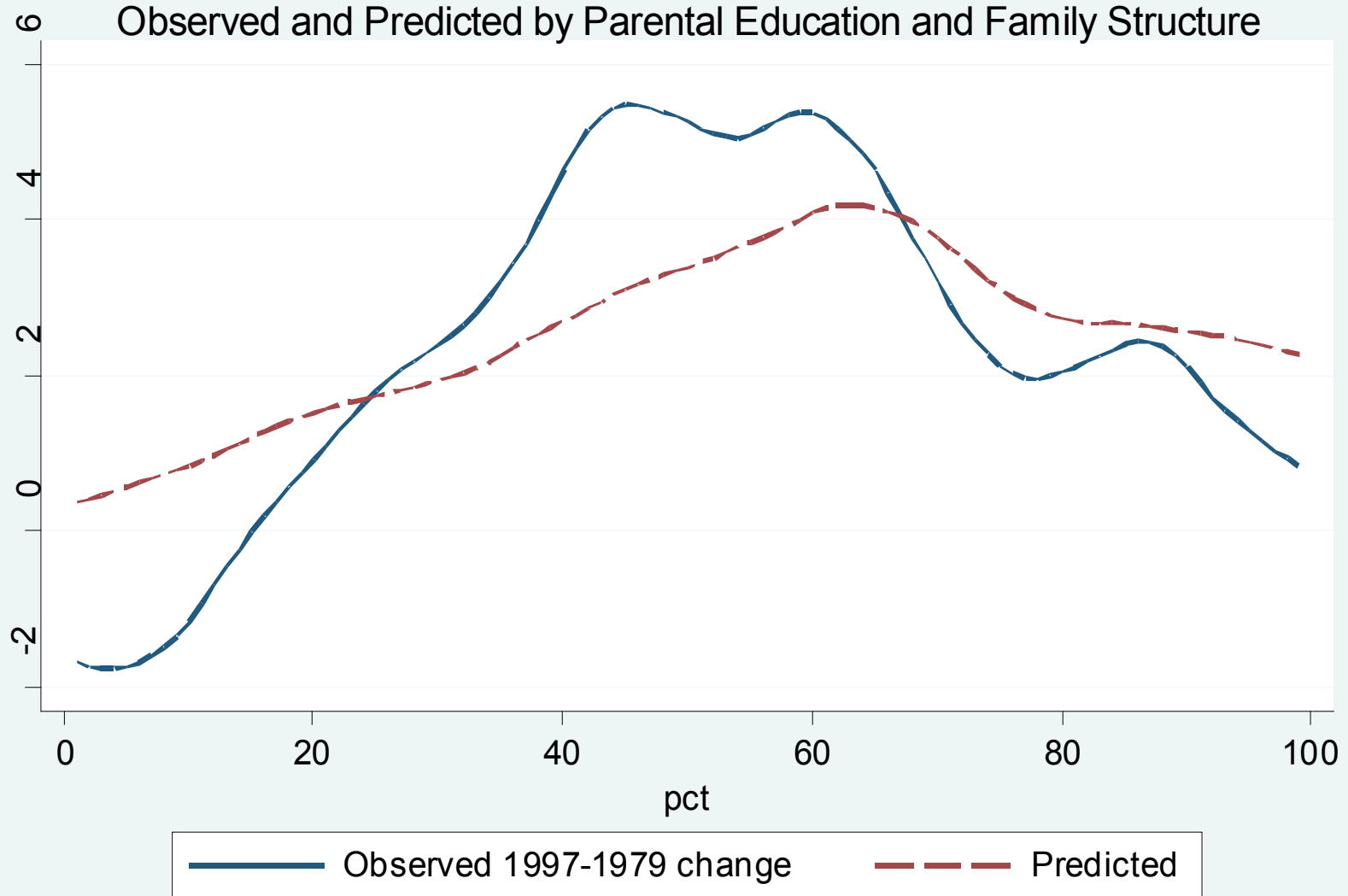
Black Females: 8.7 percentile points

Black Males: 5.6 percentile points

NAEP scores also show gains (Magnuson and Waldfogel (2008))

Figure 3: Changes in the AFQT-Distribution

Observed and Predicted by Parental Education and Family Structure



Aggregating the skill correlates using adult wages of the 1979 cohort.

Compare the adult wage distribution for the 1979 cohort to what it would have been if the 1979 cohort had the skills of the 1997 cohort

The difference in the actual wage distribution and the counterfactual distribution is the difference in the skills aggregated using the adult wage structure faced by the 1979 cohort.

Fig 1: Changes in Skills 1980-2004

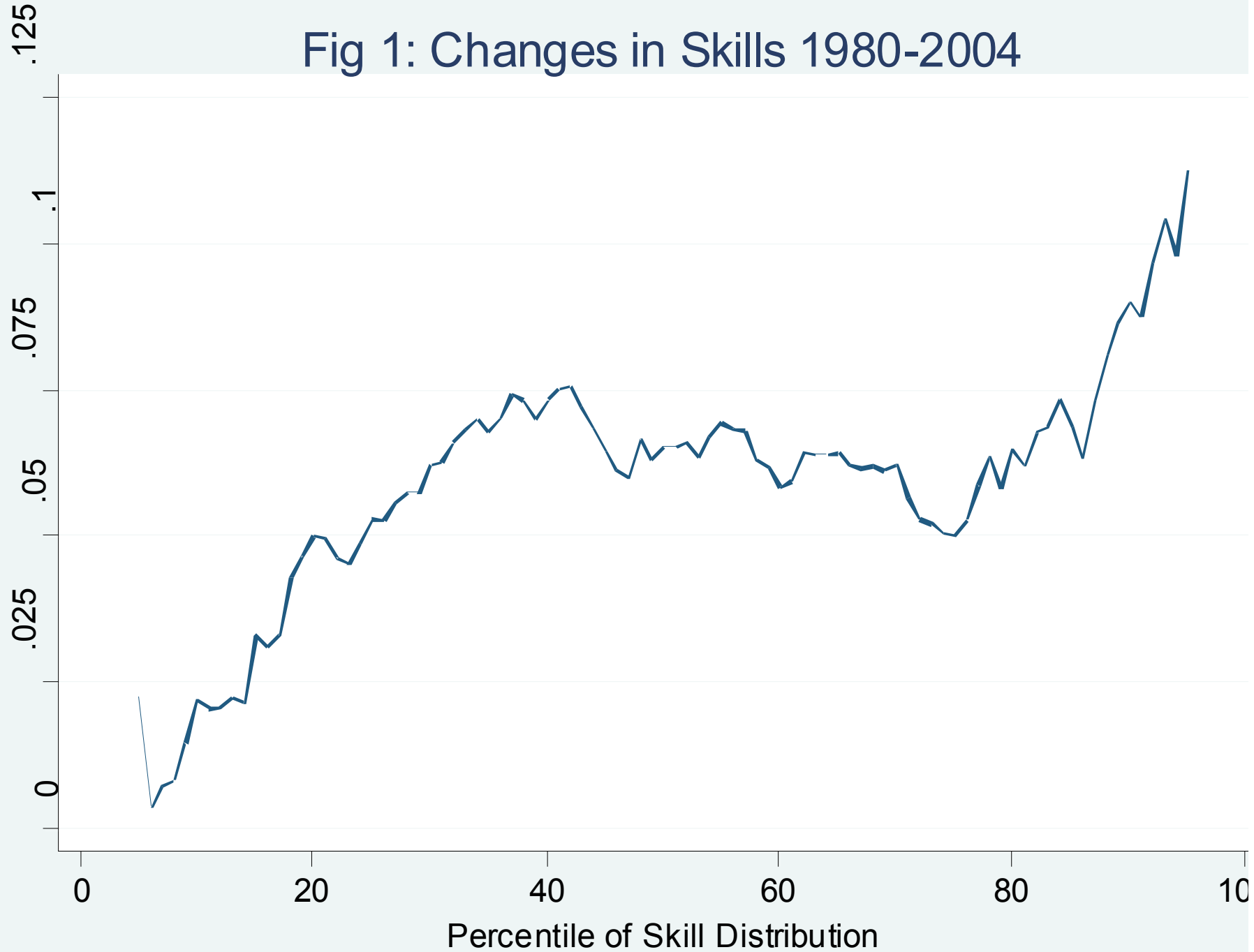


Fig 2 - 1: Predicted Change in Male Log Wages by Race

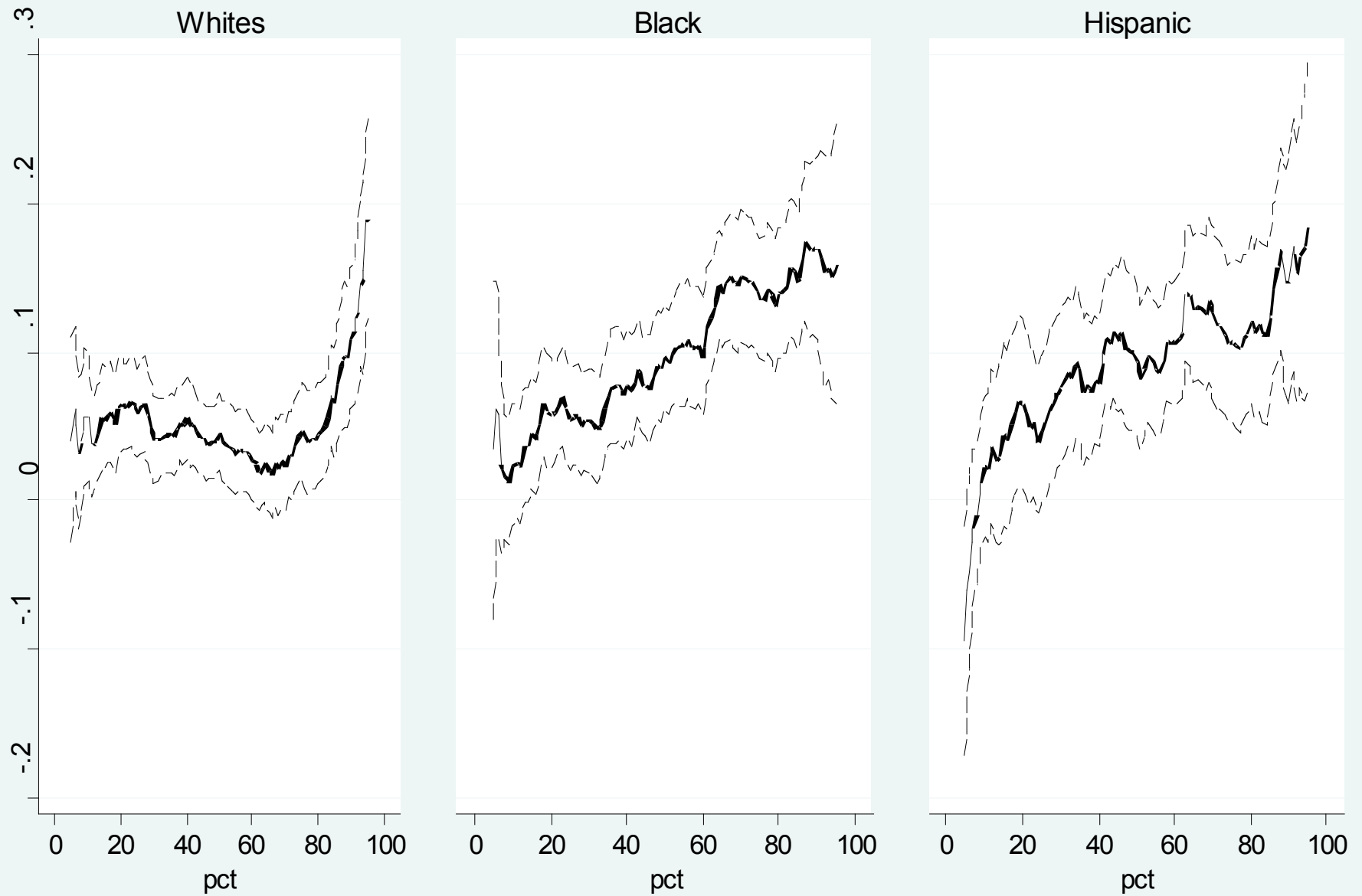
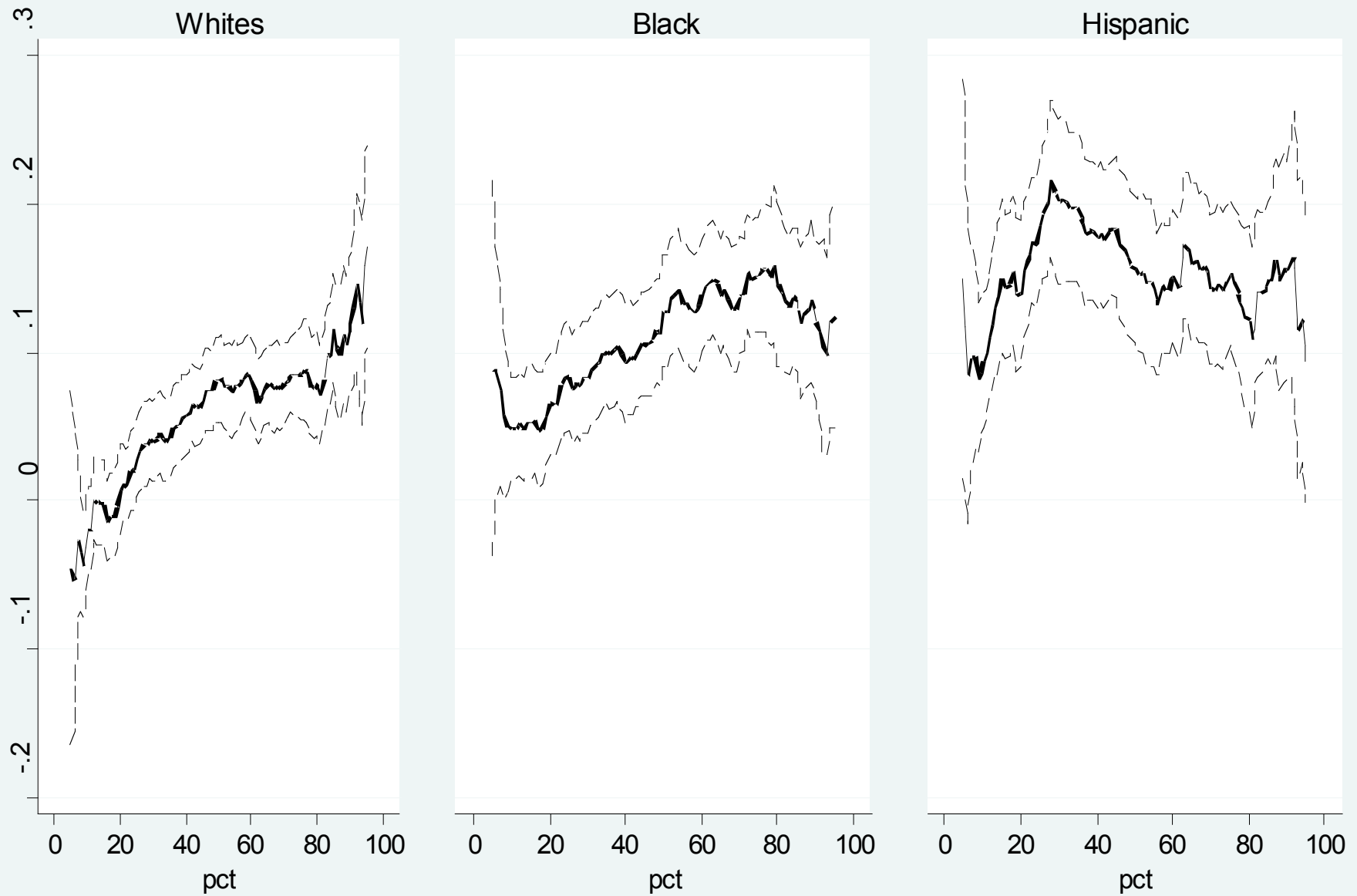


Fig 2 - 2: Predicted Change in Female Log Wages by Race



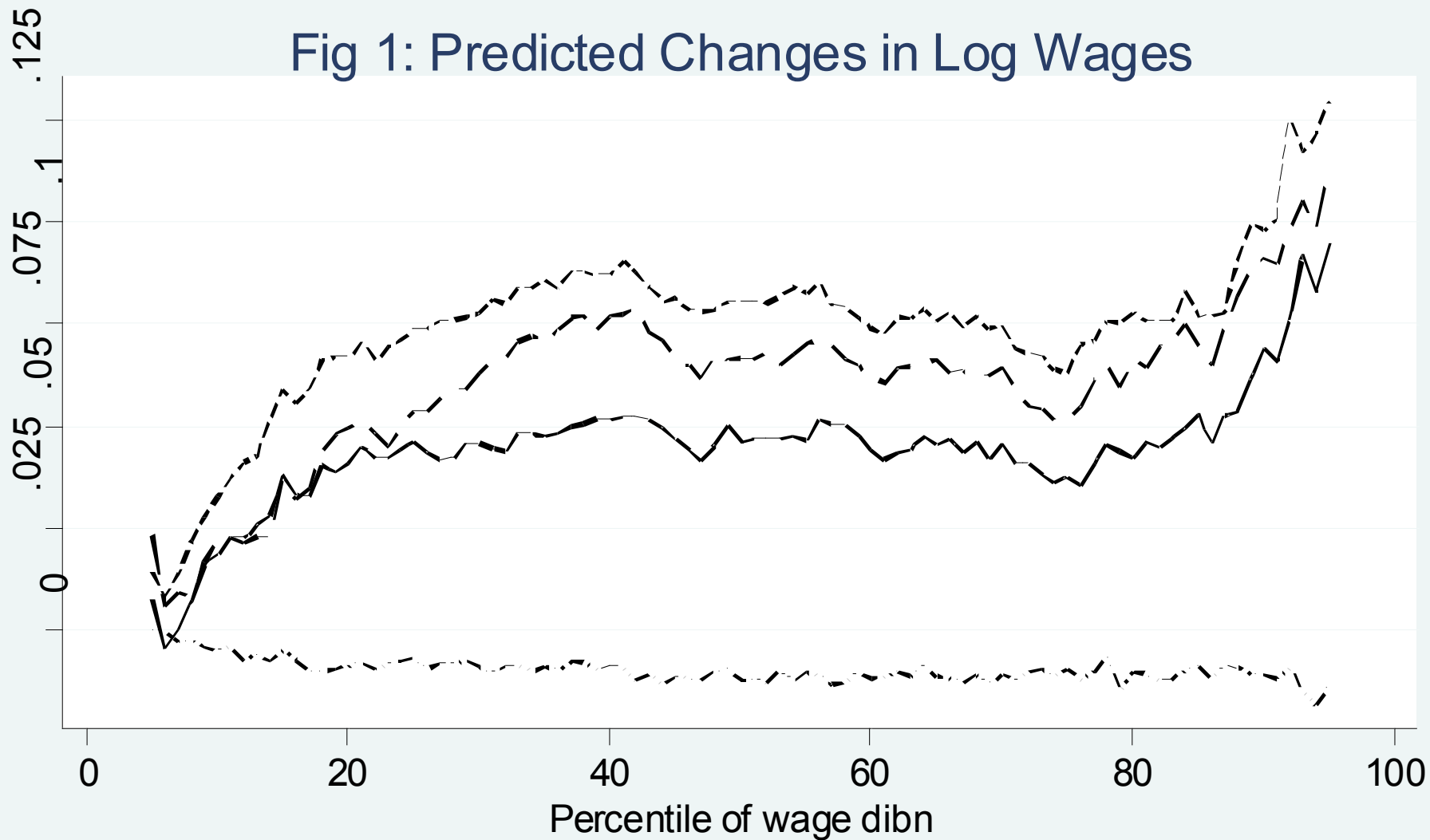
What Is Responsible for Shift in the Skill Index?

Next Look Sequential Decompositions

Decomposition

1. Order in which variables are added:
 - a. Race, Gender.
 - b. Parental Education and Family Structure.
 - c. Individual Education and AFQT.
 - d. Work Transition.
2. The order of the decomposition matters.
3. For example, the “contribution of Race and Gender” includes the direct impact and the indirect impact that arises because these variables are associated with the subsequent variables.

Fig 1: Predicted Changes in Log Wages



- | | | | |
|-------|-------------------------|-----------|-----------------------|
| | 1. Race and gender only | ———— | 2. +family background |
| ----- | 3. +AFQT and HGC | - - - - - | 4. + work transition |

Depicted are changes in log wages predicted with various prediction variables

Table 6.1B: The Contribution of Subsets of Variables to 1979 vs 1997 Difference in Means by Race and Sex

Race & Sex category	Total Change	Marginal Effects of Additional Variables					
		(1) + Family Background	(2) + AFQT	(3) + Highest Grade	(4) + Work Transition	(2) + Highest Grade	(3) + AFQT
		(1)	(2)	(3)	(4)	(5)	(6)
Male							
White	0.046	0.054	-0.013	0.020	-0.005	0.023	-0.016
Black	0.089	0.057	0.023	0.008	0.001	0.011	0.019
Hispanic	0.077	0.098	0.006	0.001	-0.028	0.022	-0.015
Female							
White	0.056	0.041	0.002	0.025	-0.012	0.035	-0.008
Black	0.101	0.060	0.039	0.006	-0.004	0.032	0.014
Hispanic	0.144	0.102	0.033	0.017	-0.008	0.047	0.003

Contrast: Standard linear decompositions of the mean

1. Linear decompositions only apply to the mean and assume a linear mean wage function.
2. Allow one to estimate partial effects of variables as well as “marginal effects”

Contribution to Means: Partial and Marginal Effects from Regression Decomposition and Propensity Weighting

	Total Change	Effects of Each Variables					
		Race and Sex	Parents HGC	Intact Family	Highest Grade	AFQT	Work Trans.
	(0)	(1)	(2)	(3)	(4)	(5)	(6)
Regression Decomposition							
Partial Effect	0.040 (0.005)	0.008 (0.001)	0.019 (0.003)	-0.008 (0.003)	0.017 (0.002)	0.012 (0.001)	-0.007 (0.002)
Marginal Effect	0.040 (0.005)	-0.009 (0.001)	0.068 (0.004)	-0.015 (0.003)	0.017 (0.001)	-0.008 (0.001)	-0.011 (0.002)
Reweighting Decomposition							
Marginal Effect	0.058 (0.012)	-0.008 (0.002)	0.071 (0.007)	-0.016 (0.005)	0.028 (0.005)	-0.007 (0.003)	-0.009 (0.005)

Summary of Main Results:

1. 1997 cohort stronger than 1979 cohort in education, parental education, test scores, but much fewer intact families.
2. Implies an average wage increase of about 6% for whites, more for minorities. Gains are larger for females than for males.
3. Widening of the skill distribution overall and within race and gender.

3. Decomposition suggest that as much as $2/3$ of increase in skills can be linked to parental education measures.

4. Conditional on parental education and family background, the average skill index increased by only about 1%.

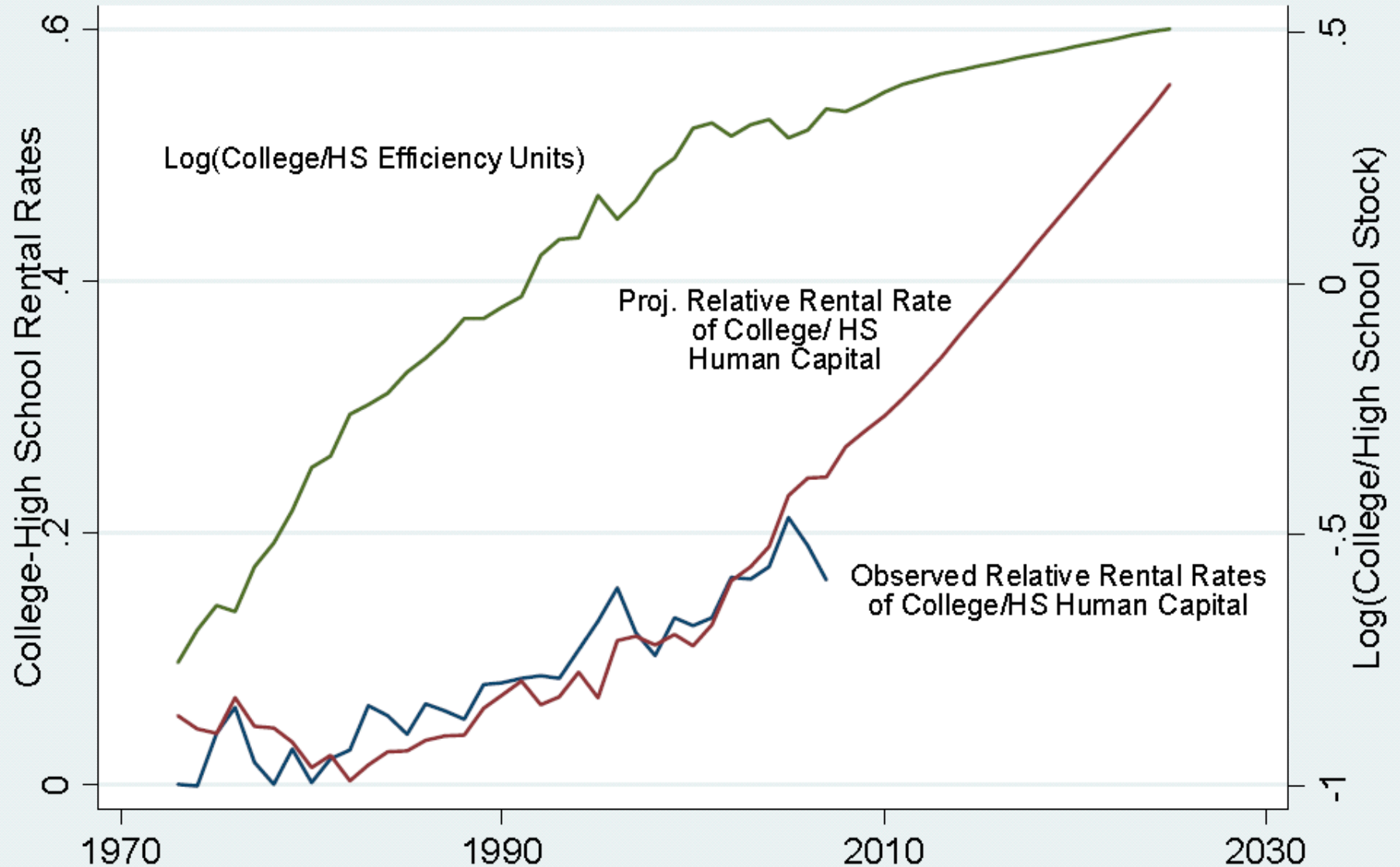
Wage Inequality in 2025

Moving From Skill Index Comparison to Forecasting Inequality in 2025

1. Literature on wage inequality 1963-2002 (Katz and Murphy (1992), Autor, Katz, and Kearney (2006)):
 - a. Constant elasticity production function with high school and college labor
 - b. Constant elasticity of substitution of $\sigma=1-2$ and SBTC of about 2.5%/year fits college premium from 1963-2002 surprisingly well.

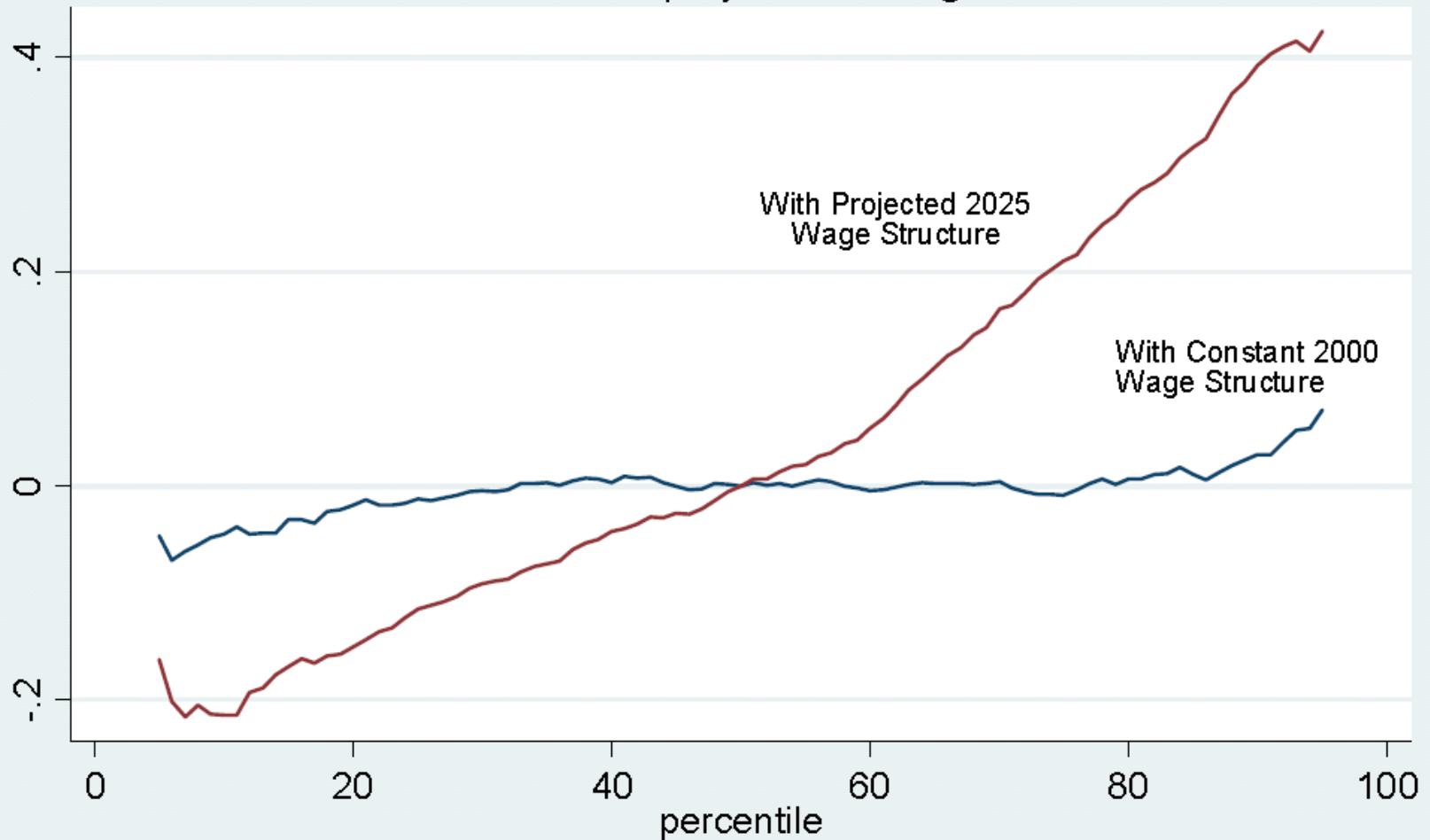
2. Predict Supply of high school and college labor using:
 - a. Skill index conditional on education.
 - b. Auxiliary information on education choices, cohort sizes, labor force participation, mortality rates.
 - c. CPS data since 1973 as well as Census/ACS data.
3. Predict College-High School Premium until 2025
4. Generate counterfactual wage distribution based on new college-high school premium and distribution of skill index.

Figure 3: College-High School Supply and Wage Premium



See section 8. Observed differences in relative rental rates normalized to 0 in 1973.

Figure 4: Change in Wage Distribution
With constant and projected College Premium



Change in Wage Distribution NLSY97 vs NLSY79. Normalized against Median