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Curtis, James E.

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#### Kontakt/Contact

ZBW – Leibniz-Informationszentrum Wirtschaft/Leibniz Information Centre for Economics  
Düsternbrooker Weg 120  
24105 Kiel (Germany)  
E-Mail: [rights@zbw.eu](mailto:rights@zbw.eu)  
<https://www.zbw.eu/econis-archiv/>

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**Excerts from advanced studies in economics**

*By James E. CURTIS Jr.* <sup>†</sup>

**Abstract.** Researchers have a long-standing interest in understanding the causes and consequences of inequality. One approach to analyzing inequality is to compare average economic choices from a classical theoretical framework. Another approach considers the impact of the formation of society, through statutes and institutions, on average economic outcomes. Curtis Jr uses applied econometrics, applied labor economics, applied theory and empirical data to provide results that we cannot reject the existence of a negatively bounded correlation between the duration of time from zero wage labor constraints and the magnitude of unexplained differences in wealth. Furthermore, Curtis Jr promotes a concept of entrepreneurial education in economics.

**Keywords.** Economics education.

JEL. A20, I20.

**1. Introduction: Applied econometrics, excerpts from wealth discrimination theory**

Econometrics "attempts to quantify economic reality and bridge the gap between the abstract world of economic theory and the real world of human activity.... Econometrics allows us to examine data and quantify the actions of firms, consumers and governments" (Studenmund, 1999, p.3).

Economic theory tells us about the anticipated direction (+/-) of changes in the economic environment. For example, theory suggests: An increase in income increases demand for goods; An increase in price decreases demand for goods.

**1.1. Econometric modeling**

Econometric modeling allows us to measure the specific amount, or the magnitude of the change.

Consider following example: Let:

$c^* = [a/(a+b)] [I/p]$  (from utility maximization); Then

$\ln(c) = \ln[a/(a+b)] + \ln(I) - \ln(p)$  such that the econometric or regression model is

$$\ln(c) = B_0 + B_1 * \ln(I) - B_2 * \ln(p) + \text{error}$$

**1.2. Ordinary least squares, OLS**

The line that "best fits" the data minimizes difference between the fitted line and the data. Let  $e_i$  be the difference between the one point on the line and one data point, then the smallest sum of  $e_i$ 's seems to produce the best fitted line. But the

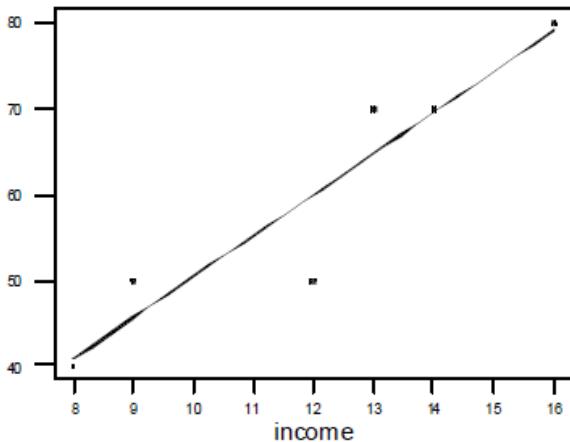
<sup>†</sup> Independent researcher, PO Box 3126, Washington, District of Columbia, USA.

✉ . +(202) 739-1962

✉ . jamesjr@jecjef.net

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smallest sum of e's can produce more than one estimate of the slope the line. Instead, by summing the square of each  $e_i$ , we can obtain one estimate of the slope. Hence, the line that "best fits" the data is a "least squares" regression line that minimizes the sum of squared error.



**Figure 1.** The Fitted Line from the Hypothetical Survey which Minimizes the sum of Squared Error

From utility maximization

$$c^* = [a/(a+b)] [I/p] \text{ such that}$$

$$\ln(c) = \ln[a/(a+b)] + \ln(I/p).$$

Normalizing the price to 1, and analyzing the data in levels produces  $c = B_0 + B_1 I + \text{error}$ , where  $B_0$  is the y-intercept or "constant": The constant tells us how many restaurant meals that we would still consume if we have zero income ( $I=0$ ).  $B_1$  is the slope of the fitted line: The slope tells us the change in the number of restaurant meals consumed we could expect with a one unit change in the value of annual income.

### 1.3. OLS slopes ( $B_s$ )

The only difference between the simple and multivariate regression models is the calculation and the interpretation of the slope. The slope ( $B_1$ ) from the multivariate regression model is the change in the dependent variable associated with a one-unit change in the independent variable, holding constant the other independent variables in the equation:

$$\ln(c) = B_0 + B_1 * \ln(I) - B_2 * \ln(p) + \text{error}$$

When using logs of the dependent variable, a slope becomes the elasticity and units become percentages.

### 1.4. Simple regression model versus the multivariate regression model

Once again, The simple regression model implies a dependent variable ( $c$ ) is only explained by one independent variable, which is not realistic. For example, quantity ( $c$ ) consumed is not just explained by price ( $p$ ). The multivariate regression model implies a dependent variable ( $c$ ) is explained by more than one independent variable, which is more realistic. For example, the combination of price ( $p$ ) and income ( $I$ ) explain quantity consumed ( $c$ ).

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### 1.5. Survey data

A hypothetical survey is two questions to six families: How many meals does your family consume at restaurants per year? What is your annual family income? The hypothetical results of the survey are presented in Table 1.

**Table 1. A Hypothetical Survey of 6 Families, Annual Income and Restaurant Meals/Year**

Family No.	No. of Restaurant meals per year	Annual income (\$1000)
1	50	12
2	70	13
3	70	14
4	50	9
5	80	16
6	40	8

**Source:** Data Analysis from Curtis Jr (2001); also data from Gitter & Simon (2001).

### 1.6. Survey data and empirical results

Empirical results are the output from the econometric model and statistical software (or calculations using a calculator), where  $c = 2.6 + 4.78 I$  and where estimated  $B_0 = 2.6$ . Thus, we can predict that families will visit restaurants 2.6 times annually even if they have zero annual income. Estimated  $B_1 = 4.78$ . Thus, we can predict that the number of annual restaurant visits increase by 4.78 with one unit (one thousand dollar) increase in annual income.

### 1.6. Testing hypotheses

Hypothesis Testing are statistical tests, such as t-tests, on the accuracy of slopes calculated in an econometric model before accepting the results. In the way in which the FDA withholds approval of a new medication that has a side effect more frequently than expected, economists withhold "accepting" a calculated coefficient until it passes certain statistical or hypothesis tests (Studenmund, 1999, p.126).

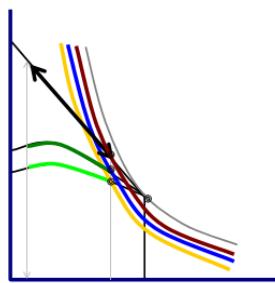
## 2. Applied labor economics, excerpts from essays in applied labor economics

Several studies in applied theoretical research... assumes ability is genetically explained, by empirically measuring family and group panel datasets of other explanatory variables, but sometimes, employing other methods without full social-scientific agreement, including biological/DNA/genetic data in economic and social analyses.

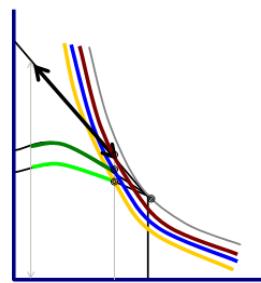
Several studies in applied theoretical research... analyzes human capital, or the impact of innate, unobserved ability and training, or the capacity to be trained, on hours worked, wages, and investment choices. Several studies conduct empirical research that analyzes data, without measures of unobserved ability, on the capacity to 'precisely' predict the contributions (or 'non-contributions') to observed socio-economic outcomes, and to observe the capacity of the model to make group comparisons in predictions. via possible methods like two-stage, first-difference, and/or cohort analyses from applied econometrics, in order to attempt to eliminate the potential bias due to unobserved ability.

Several studies of applied theoretical research... present results from theoretical-simulations. Consider the possibility of data from random draws of numbers on one side of the pendulum and data, based on monitoring involuntary subjects for economic phenomena, and analyzing the asymmetric (contexts of) 'information' or 'data' of monitored involuntary subjects, on the other side of the pendulum.

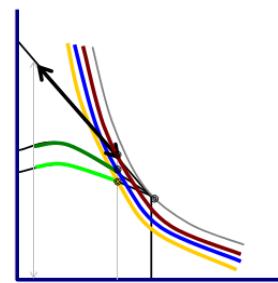
Note that this poses interesting questions, but possibly includes 'false starts' in measuring the impact of progressive budget policies, for individuals, for instance, who have significantly progressed or attempted to progress beyond historical family outcomes, in terms of educational attainment and/or wealth accumulation.



**Figure 1. Hours of Work, Leisure & Time**



**Figure 2. Social Intellectual Advances, Leisure & Higher Education Schooling**



**Figure 3. Wealth Acquisitions, Leisure & Real Space**

**Source:** Graph created by Curtis, Jr. (2003), References include John C Ham, applications include constraints on the portion of hours of work and leisure.

### 3. Applied theory, excerpts from differences in wealth, evidence from structural regression decomposition

#### 3.1. Components of wealth, theory

Wealth is determined by (i) wage rates offered by firms, (ii) individual choices of hours of work and commodity consumption, (iii) market prices of commodities, (iv) initial wealth of individuals and (v) market rates of returns on invested initial wealth and savings.

Market prices of labor, Wages: Consider the following single period model, formalized by Arrow (1972), where owners of firms seek to maximize their utility, which includes short-run profits & types of labor.

Market supply of labor, hours of Work and trade-offs from commodity consumption: Ham, Jakobsen & Reilly (1998) estimate parameters from labor supply equations derived from the Lucas-Rapping Model where:

"The lifetime utility function is assumed to be additively separable over time.

The current within-period utility is a non-additively separable function of food consumption, other non-durable consumption and male labor supply...

We rule out corner solutions by assuming that the individual consumes a positive amount of both goods and provides at least one hour of male labor supply in each period. Finally, the consumer is assumed to face no additional constraints in any market, including the labor market. In this situation the consumer faces only a period t lifetime wealth constraint. (pp.7-8). Using the first order conditions, Ham, Jakobsen & Reilly (1998) show how structural and reduced-form labor supply regression equations can be estimated. They also "consider a Keynesian or disequilibrium model of the labor market as an alternative to the L-R model. In these models unemployed individuals cannot work as much as they would like to during a given year because they face a constraint on their labor supply" (p.11).

They show that hours of work can be estimated using wage rates, food prices, non-durable commodity prices and industry or occupation unemployment rates.

Wealth, inheritance and initial wealth: Initial wealth is obtained through inheritance or intergenerational transfers. Becker & Tomes (1979) formulate a model for initial wealth where families choose wealth of the children or investments in children and parental consumption to maximize the family utility function subject to parental income constraint, child (or children) income constraint and endowments.

Wealth and rate of return on savings, including assets. Schlomo Yitzhaki (1987) models the group-specific rates of return using sale and purchase price of assets:

"The... simpler way for calculating the rate of growth of wealth for comparing groups of investors, is to find out, for each group the total value of wealth at the beginning and the end of the period, and then calculate the instantaneous rate of growth of wealth. Formally... we have to aggregate the costs and the proceeds for each holding period and then calculate the rate of growth. Actually, this is the rate of return of the investors for their

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investments... (Furthermore) if we have several observations on the rate of return on a portfolio—we have to aggregate them first and then calculate the rate of return." (pp. 80-82).

Thus, the rate of return is function of sale and purchase price of assets.

Discrimination in the price of assets, such as real estate assets, can cause certain groups to obtain a lower sale price or pay a higher purchase price, and thus, obtain a lower rate of return than obtained by members of other groups. There is an extensive literature on how such discrimination can occur in housing market prices. For instance, Martin Bailey (1959) first introduced the border model. His model assumes that:

"Members of group X prefer living near group Y to living entirely surrounded by other members of group X, while members of group Y prefer to live entirely surrounded by other members of group Y." (Members of group Y) considers it unpleasant to live near people with lower incomes and with tastes and habits 'inferior' to their own, while the reverse is sometimes and perhaps not generally true... (Furthermore) Suppose streets A, B, C, and D are occupied entirely by members of group X, while streets E, F, G, etc. are occupied entirely by members of group Y; and suppose that only occupants of streets D and E consider themselves affected by their proximity to members of the opposite group. Under the assumed conditions, if people do not anticipate any change, the properties along street D will sell (and rent) at prices higher than those along streets A, B, and C, and the properties along street E will sell (and rent) at prices lower than those on streets F, G, etc."

(pp.288-89).

Thus, group specific rates of returns are not only determined by sale and purchase price of assets, but are also determined by the preferences of those that affect the price of the asset, similar to the discrimination coefficient that affects the size of wages paid to different groups.

Wealth, Prices of market consumption products, and Price-Adjusted Wealth or Real Wealth

When markets are competitive and firms have all the same cost structure, a large number of firms and buyers in the market cause prices to be fixed at the additional cost to providing the good or service because information is fully available on alternative suppliers and customers. Furthermore, free entry and exit price markups, causing market prices to be at equilibrium and markets to be efficient—where voluntary participation in a market-oriented distribution of goods and services maximizes the net gains to producers and consumers.

However, when markets are less competitive, such as monopoly, prices are marked up over the additional cost to providing the good or service, based on consumers' responsiveness to price and the producer's share of the market. This leads to an amount of goods and services, which are bought and sold, that is below the competitive market outcome leading to inefficiencies and additional gains from government regulation. Moreover, when markets are less competitive, producers can price discriminate if they know the willingness and ability of individual consumers to purchase their goods and services. While such practices are generally accepted and encouraged for goods such as senior and student movie theater tickets or lunch and dinner restaurant prices, price discrimination based on race is equivalent to statistical discrimination—making predictions about a person based on membership in a certain group (Stockton, 1999, p.434) and using an individual's membership in a certain group as information on the individual's skill and productivity (Borjas, 2000, p.357). Offering an individual in a racial group a price that is different from a price offered to an individual in another racial group, such as mortgage rate, (holding all other variables constant), constitutes economic discrimination. The gains to firms from these practices are the equivalent to the gains to firms specified from offering different wage rates discussed in section one.

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### 3.2. Components of wealth, theory of wealth differences

Differences Wealth is a function of (i) income, including hours of work and wages, (ii) initial wealth, (inheritance), or intergenerational transfers; (iii) rate of return on saving wealth, including financial assets and homeownership; and (iv) size of household. The following describes literature of statistical results concerning wealth.

Income, including hours of work and wages: Additional studies concentrated on this role of income and savings in black-white wealth differences. Using 1983-84 SIPP data, Oliver & Shapiro (1989) find that income differences do not explain wealth differences. They show that wealth and financial assets differed among blacks and whites when controlling for income groups. Blacks had less than 50 percent of the wealth held by whites across all income categories while less than 25 percent of the financial assets held by whites. Conley (1999) confirmed his results. He found that blacks had less wealth at all levels of income even though blacks saved more than whites<sup>19</sup> and blacks were self-employed more than whites (12 percent vs. 10 percent). Using the results, Henry Terrell (1971) also found large differences in black and white wealth when for education and income. Franklin & Smith (1977) used 1967 DC Estate Records to show that black and white net worth also differed when controlling for average income.

Wolff (1992) uses SCF, SFCC, and SIPP from 1940 – 1988 to show that the black-white difference in net worth exceeded differences in income. The black-white income ratio held or rose to 60 percent from 1940 to 1985 while the black-white ratio of net worth was below 25 percent from 1962 to 1988.

Wealth Differences, in the form of Inheritance and initial wealth. Several studies have focused on the role of initial wealth or intergenerational transfers on black-white wealth differences. Menchik & Jiankopolos (1997) found effects of intergenerational transfers on black-white wealth differences. They used 1976 National Longitudinal Surveys and 1989 Survey of Consumer Finances to conduct regression decomposition. Foremost, they calculated permanent income using predicted current income at age 60. Explained wealth differences ranged between 30-37 percent of the 1976 pooled sample; 58 percent of 1989 married sample; and 72 percent of the 1989 single sample. But they found 25 percent of white households and 10 percent of black households received inheritance but only 10-20 percent of the explained differences were due to inheritance. Using tobit analysis, they found white households with fewer children, with more schooling among fathers and with deceased parents had higher probability of receiving inheritance. Wolff (1998) confirmed these results. He used 1983 –1995 SCF data to show that blacks and whites possessed different proportions of their wealth originating from inheritance (blacks: 11 percent vs. 24 percent for whites).

Altonji, Doraszelski & Segal (2000) observed limited effects of intergenerational transfers on black-white wealth differences. They used 1984-1994 PSID data to conduct OLS and fixed effect regression decomposition. To obtain the fixed effect, the calculated permanent income from an individual-specific effect of income regression normalizing age to 40. To conduct fixed effect decomposition, the authors used sibling differences to net out a fixed inheritance effect and found little change in results. Explained wealth differences ranged between 30-111 percent for pooled sample depending on the coefficient used in the analysis. After conducting a fixed effected analysis of sibling differences and comparing to OLS results with no fixed effect, the authors found no significant differences: controlling for inheritances does not change the portion of unexplained differences significantly. They proposed that differences in savings or rates of return might be more effective in explaining black-white differences in wealth than intergenerational transfers.

Wealth Differences, in the form savings assets. Additional studies have focused on the role of financial assets in wealth differences. Brimmer (1988) used 1984 Census data to show that blacks held 5 percent or less of any individual asset. Stocks consisted of 2 percent of black net worth and 0.13 percent of US stocks.

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Additionally, he found that whites at lower incomes were more likely to hold stocks than blacks. Snyder (1989) confirmed these asset differences. He used 1982 NBS data to show that black asset portion of the retirement portfolio (3.6 percent) was smaller than the portion in the Hispanic portfolio (9-10 percent) and whites (20 percent). Terrell (1971) also confirmed significant asset differences among blacks and whites. Descriptive statistics from 1967 Survey of Economic Opportunity data show that blacks held 24.1 percent of white non-financial assets and 6 percent of white financial assets. But 72 percent of the black non-financial assets were in consumption services while only 53 percent of white assets were stored in this manner<sup>20</sup>. Wolff (1998) also found larger differences in financial assets decades later using 1983-95 SCF data. The black-white ratio of mean financial worth fell to 11 percent while black-white ratio median financial net worth held constant at 0 percent.

Some research has estimated the source of asset differences among blacks and whites. Using probit regression analysis, Hurst, Luoh & Stafford (1998) found blacks are less likely to own stocks and transaction accounts when controlling for income and demographic variables. They suggested that lack of experience with transaction account ownership may impact potential ownership of other assets. Chiteji & Stafford (1999) confirmed this proposition. They used 1984 and 1994 PSID data to analyze the role of financial asset accumulation on black-white wealth differences. Probit analysis shows that parental ownership of stock increases the probability of stock ownership among young families causing race to become statistically insignificant. Keister (2000) also confirmed these findings. She used SCF data from 1983 and 1986 to analyze black-white wealth differences. Using logit regression analysis, she shows that blacks were less likely to own high-risk assets (such as business assets, stocks, and bonds) after controlling for income, education, age, marital status and ownership. She also found that past ownership of assets predicts current ownership of assets.

Furthermore, income predicts ownership of assets but education variables were not consistent across past and current owners. Finally, she used a simulation method to show aggregate improvements occur in the distribution of wealth when removing race effects and augmenting black education effects.

Wealth Differences, in the form of assets of homeownership. Wolff (1992) uses SCF, SFCC, and SIPP from 1940 – 1988 to show that the black-white difference in net worth exceeded differences in homeownership. The black-white home ownership ratio held or rose to 60 percent from 1940 to 1985 while the black-white ratio of net worth was below 25 percent from 1962 to 1988. Even though wealth differences ranged further than homeownership differences, their correlation remained unchanged. Birmbaum & Weston (1974) used 1967 SEO data to show the correlation of wealth and homeownership. They used GLS regression analysis to calculate the predicted probability of owning home using a sample split by race. They found differences in wealth increased the explained differences in the probability of homeownership. They also found that the black wealth portfolio primarily consisted of homes unlike white wealth: 72 percent of black wealth while only 35 percent of white wealth was in homes. However, 59 percent of whites own homes while only 39 percent of blacks owned homes.

Wealth Differences and the size of the household. Keister (2000) shows a significant impact of resource dilution of (household structure) on wealth. She used 1985 and 1996 NLSY data to analyze the role of household structure on black-white wealth differences. She provides a review of the literature on the theory of resource dilution—the impact of family organization on material resources, parental attention, intervention and child opportunities—and shows that it accounts for an inverse relationship between the number of children and education outcomes. Using GLS regression analysis and logit analysis, she found that resource dilution impacted the accumulation of black and white assets differently, the probability of blacks and whites owning assets differently, and upward mobility among blacks and whites differently.

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### 3.3. Empirical/statistical differences in wealth

The following review of the literature is based on empirical difference in wealth, (i) based on observed differences in distribution of wealth, (ii) locality differences in wealth, and (iii) regional differences in legal protections of individuals based on skin color.

Overall distributional comparisons also show significant differences in black and white wealth. Terrell (1971) used Gini coefficients and distributional analysis to show black wealth was less evenly distributed than whites. Hurst, Luoh & Stafford (1998) analyzed PSID data to analyze black-white wealth differences and found that the wealth of blacks was more mobile than the wealth whites due to a more narrow wealth range among blacks. They also found that 70 percent of blacks in the sample still had no wealth after 10 years passed. Using distributional analysis such the Lorenz Curve, they found black wealth grew faster during the 10-year period but these changes were not observable in the overall distribution of wealth due to large difference in distributional patterns among blacks and whites.

Franklin Smith (1975) analyzed a sub-sample of DC residents in the mid 1960's to observe similar black-white wealth differences. He used 1967 DC Estate Records and descriptive statistics to show that blacks possessed 1/19 of white estate in DC. Using a log regression analysis of black wealth, he also found blacks in DC still owned \$3300 less wealth (in 1967) when controlling for age, gender, occupation, marital status and birthplace.

Conely (1999) used results from analyzing 1984-94 PSID data to propose that legal and class barriers were the source of black-white wealth differences. He suggested that there were legal barriers to economic growth in the black community, including black codes in the south (e.g. SC), coerced failure of Freedman's Bank in 1874, racial discrepancies in Old Age Insurance in 1935, redlining in HOLC in 1933, and redlining in Federal Housing Authority & Veterans Administration in 1937. Using regression analysis of log wealth, Conely found parental wealth had a more significant impact on net worth than race and suggested that social class is more important than racial differences.

## 4. Economics education, excerpts from economics textbook materials

The objective of the university course is to convey intermediate concepts of microeconomic theory to students using explanatory, graphical and mathematical methods of analysis. Microeconomics is the study of the efficient choices made by individuals, including consumers, workers, owners of firms and social planners ... The only prerequisite for this course is successful completion of Principles of Microeconomics..., or equivalent. After completing the rigorous work requirements in this course, students should have a sufficient set of skills to thoroughly analyze interesting economic questions and to effectively participate in (i) advanced undergraduate economics courses, (ii) core graduate economic theory courses, and (iii) graduate courses in the school of business, including MBA programs.

Markets	Theory of Consumer Choice	Theory of the Firm
<ul style="list-style-type: none"><li>• Circular Flow of Goods and Services<ul style="list-style-type: none"><li>- Product Markets<ul style="list-style-type: none"><li>• Consumers demand products<ul style="list-style-type: none"><li>- Elasticity</li></ul></li><li>• Producers supply products<ul style="list-style-type: none"><li>- Elasticity</li></ul></li></ul></li><li>- Labor Markets<ul style="list-style-type: none"><li>• Workers supply labor</li><li>• Firms demand labor</li></ul></li><li>• Equilibrium</li><li>• Efficiency</li></ul></li><td><p><b>Theory of Consumer Choice</b></p><ul style="list-style-type: none"><li>• The theory of consumer choice explains how you choose goods &amp; services to consume by analyzing your budget and preferences.</li><li>• Lecture Topics:<ul style="list-style-type: none"><li>- Budget Constraint</li><li>- Preferences &amp; Axioms</li><li>- Optimal Choice &amp; Demand<ul style="list-style-type: none"><li>• Income &amp; Substitution Effects</li><li>• Income &amp; Engel Curves</li></ul></li><li>- Applications:<ul style="list-style-type: none"><li>• Labor Supply</li><li>• Intertemporal Consumption</li></ul></li></ul></li></ul></td><td><p><b>Theory of the Firm</b></p><ul style="list-style-type: none"><li>• The theory of the firm describes how owners of firms choose inputs to produce goods and services given market prices of inputs. Topics:<ul style="list-style-type: none"><li>- Production function<ul style="list-style-type: none"><li>• Returns to Scale</li></ul></li><li>- Optimal Choice of Inputs<ul style="list-style-type: none"><li>• Profit Maximization</li><li>• Cost Minimization<ul style="list-style-type: none"><li>- Returns to Scale</li></ul></li></ul></li><li>- Optimal Choice of Output and Prices<ul style="list-style-type: none"><li>• Types of Markets</li></ul></li></ul></li></ul></td></ul>	<p><b>Theory of Consumer Choice</b></p> <ul style="list-style-type: none"><li>• The theory of consumer choice explains how you choose goods &amp; services to consume by analyzing your budget and preferences.</li><li>• Lecture Topics:<ul style="list-style-type: none"><li>- Budget Constraint</li><li>- Preferences &amp; Axioms</li><li>- Optimal Choice &amp; Demand<ul style="list-style-type: none"><li>• Income &amp; Substitution Effects</li><li>• Income &amp; Engel Curves</li></ul></li><li>- Applications:<ul style="list-style-type: none"><li>• Labor Supply</li><li>• Intertemporal Consumption</li></ul></li></ul></li></ul> 	<p><b>Theory of the Firm</b></p> <ul style="list-style-type: none"><li>• The theory of the firm describes how owners of firms choose inputs to produce goods and services given market prices of inputs. Topics:<ul style="list-style-type: none"><li>- Production function<ul style="list-style-type: none"><li>• Returns to Scale</li></ul></li><li>- Optimal Choice of Inputs<ul style="list-style-type: none"><li>• Profit Maximization</li><li>• Cost Minimization<ul style="list-style-type: none"><li>- Returns to Scale</li></ul></li></ul></li><li>- Optimal Choice of Output and Prices<ul style="list-style-type: none"><li>• Types of Markets</li></ul></li></ul></li></ul> 

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### 4.1. Study questions 1 of 2, economic fundamentals

A. Define the following terms and provide an example:

Economics, Scarcity, Microeconomics, Macroeconomics, Law of Demand, Law of Supply, Efficiency, Factors of production, Equilibrium, Elasticity.

B. Using graph of supply and demand curves, show the effect of the following events. For full credit, label the following: axis (price, quantity); supply and demand curves; old equilibrium quantity (Q1); old equilibrium price (P1); new equilibrium (P2); and new equilibrium quantity (Q2):

Consider the market for Microsoft Office 2000 software. What will happen in this market when:

i. Microsoft releases Microsoft XP, a more expensive system software needed for Office 2000 to operate but helps Office 2000 operate more efficiently.

ii. The price of Corel's Office 2000 software increases.

iii. Microsoft renews its contact with the makers of machines that manufacture Office 2000 but the price of the machines double.

iv. The price of Dell computers (hardware) declines.

v. Microsoft buys new machines that manufacture Office 2000 at the same price but produces twice as much software per hour.

vi. More senior citizens and teenagers are trained to use Office 2000.

Consider the market for tangerines. What will happen when:

vii. The price of pest repellant decreases.

viii. The price of oranges increases.

ix. A bad storm wipes half of the harvest.

x. People go on diets and increase the number of fruits and vegetables in their diets.

C. Suppose that the market for a bag of tangerines is described by the following equations:

$$P_s = (1/3)Q_s$$

$$P_d = 12 - Q_d$$

i. Calculate the equilibrium price and quantity of bags of tangerines.

ii. Derive the demand and supply schedules for bags of tangerines.

Price	Quantity Demanded	Price	Quantity Supplied
0		6	
1		5	
2		4	
3		3	
4		2	
5		1	
6		0	
7			
8			
9			
10			
11			

### 4.2. Study questions 2 of 2, economic fundamentals

iii. Graph the equilibrium quantity and price. Show the consumer and producer surplus.

iv. Calculate the consumer surplus and producer surplus.

v. Suppose farmers successfully lobby Congress to impose a price floor of \$2 per bag of tangerines. What happens to the number of bags of tangerines demanded and supplied?

vi. Suppose consumer advocates successfully lobby Congress to impose a price ceiling of \$4 per bag of tangerines. What happens to the number of bags of tangerines demanded and supplied?

vii. Calculate the price elasticity of demand when equilibrium price increase by a dollar. How responsive are consumers to changes in price?

viii. Calculate the price elasticity of supply when equilibrium price increase by a dollar. How responsive are consumers to changes in price?

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D. Suppose the United States and Russia trade computer software and tangerines. Let the following represent the US and Russian demand and supply schedules for pounds of tangerines.

United States				Russia			
Price	Quantity Demanded	Price	Quantity Supplied	Price	Quantity Demanded	Price	Quantity Supplied
0	12	0	0	0	6	0	0
1	10	1	1	1	5	1	2
2	8	2	2	2	4	2	4
3	6	3	3	3	3	3	6
4	4	4	4	4	2	4	8
5	2	5	5	5	1	5	10
6	0	6	6	6	0	6	12

i. Derive the World demand and supply schedules for bags of tangerines.

Price	Quantity Demanded	Price	Quantity Supplied
0	6		
1	5		
2	4		
3	3		
4	2		
5	1		
6	0		

ii. Graph the US, Russian and World equilibrium prices and quantities (on separate graphs).

iii. Graph the domestic countries with the world price. Label the areas of the graph including the amount of imported (due to a shortage) or exported (due to a surplus); consumer surplus; and producer surplus. (Do not calculate anything in this problem).

### 4.3. Study questions 1 of 1, theory of consumer choice

A. Define the following terms:

- |   |   |
|---|---|
| i. Consumer Choice Theory                       | ii. Preferences                               |
| iii. Preference Ordering                        | iv. Ordinal Ranking vs. Cardinal Ranking      |
| v. Utility                                      | vi. Marginal Utility                          |
| vii. Marginal Rate of Substitution              | viii. Indifference Curve and Indifference Map |
| ix. Additive Utility and Multiplicative Utility | x. Feasibility                                |
| xi. Completeness of Preference Orderings        | xii. Monotonicity                             |
| xiii. Transitivity                              | xiv. Convexity                                |
| xv. Optimal Choice                              | xvi. Income Consumption Curve and Engel Curve |
| xvii. Price Consumption Curve and Demand Curve  |   |
| xviii. Substitution Effect and Income Effect    |   |

B. For each of the following utility functions in *i-v*, answer questions *a-f*.

- Identify the utility functions and provide an example of the consumption goods;
- Explain which preference axioms hold and which preference axioms do not hold;
- Derive the utility schedule and graph an indifference curve map to scale for only the FIRST value of the utility function;
- Graph the optimal consumption bundle when  $p_x = \$20$ ,  $p_y = \$10$ , and  $M = \$60$ . Label the values of  $x^*$ ,  $y^*$  and  $U(x^*, y^*)$ ;
- Graph the income consumption curve and Engel curve for  $x$  and  $M = \$20, 40, 60, 80, 100$ ; (You do NOT have to draw the indifference map to scale).

Suggested values of  $U(x, y)$  for indifference curve map:

i.	$U(x, y) = x^{\frac{1}{2}}y^{\frac{1}{3}}$ <u>Note:</u> $x = U^2/y^3$	$U = 1, 2, 3, 4, 5$
ii.	$U(x, y) = x + y$	$U = 4, 5, 6, 7, 8$
iii.	$U(x, y) = \min(x, y)$	$U = 1, 2, 3, 4, 5$
iv.	$U(x, y) = x^{\frac{1}{2}} + y^{\frac{1}{2}}$	$U = 4, 5, 6, 7, 8$
v.	$U(x, y) = x^2 + y^2$	$U = 4, 9, 16, 25, 36$

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C. Answer the following questions on substitution and total effects:

i. Consider an individual with utility as described by B.i and a budget constraint as described in B.d. If the price of x increases to \$30, calculate the proportion of the total effect that is due to a substitution and an income effect. Also, graphically show the components of the total effect.

ii. Consider an individual as described in B.ii and a budget constraint as described in B.d. If the price of x decreases to \$5, graphically show the components of the total effect.

iii. Consider an individual as described in B.iii and a budget constraint as described in B.d. If the price of x decreases to \$5, graphically show the components of the total effect.

D. Assume that consumers consume meals (x) and clothes (y). Consider an individual with utility as described by B.i and the price of meals equals four dollars, the price of clothes equals fifty dollars, and his or her income equals one thousand dollars.

i. Could the individual have a utility function as described in B.ii or B.v? Why or why not?

ii. If the government wants to raise a certain amount of revenue (per average consumer), is it better to access a one-dollar quantity tax on meal or an income tax (equivalent to the revenue from the quantity tax)? Prove your answer mathematically and provide a “well-labeled” graph.

E. Mathematically prove and graphically show that the slope of the budget constraint equals the price ratio.

### 4.4. Study questions 1 of 2, theory of the firm

A. Define the following terms:

i. Theory of the firm

ii. Production Function / Isoquant

iii. Marginal Product of Labor vs. Marginal Product of Capital

iv. Marginal Rate of Technical Substitution

v. Constant Returns to Scale vs. Increasing Returns to Scale vs. Decreasing Returns to Scale

vi. Law of Diminishing Returns (marginal Product)

vii. Cost Function / Isocost Curve

viii. Profit Function / Isoprofit Line

ix. Cost-Minimizing Optimal Choice vs. Profit Maximizing Optimal Choice

x. Output Expansion Path

B. Production and returns to scale

i. (Frank, Chapter 9, #1) Graph the short-run total product curves for each of the following production of K is fixed at  $K_d=4$

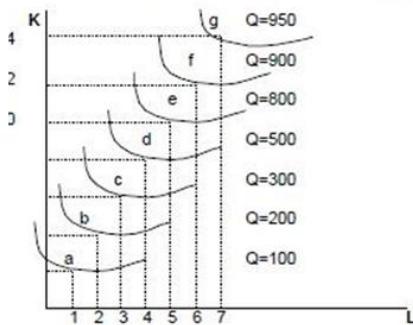
a.  $Q = f(K, L) = 3K + 2L$

b.  $Q = f(K, L) = K^2L^3$

ii. (Frank, Chapter 9, #2) Do the two production functions in problem 1 obey the law of diminishing returns?

iii. (Frank, Chapter 9, #10) Identify the regions of increasing (IRS), constant (CRS), and decreasing (DRS) returns to scale on the isoquant map below.

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iv. (Varian, Chapter 17, #1) Consider the production function  $f(x_1, x_2) = x_1^2 x_2^4$ . Does this represent constant, increasing, or decreasing returns to scale?

v. (Varian, Chapter 17, #2) Consider the production function  $f(x_1, x_2) = 4x_1^{1/4} x_2^{1/3}$ . Does this represent constant, increasing, or decreasing returns to scale?

vi. (Varian, Chapter 17, #3) The Cobb-Douglas production function is given by  $f(x_1, x_2) = Ax_1^a x_2^b$ . It turns out that type of returns to scale of this function will depend on the magnitude of  $a+b$ . Which values of  $a+b$  will be associated with different kind of returns to scale?

### 4.5. Study questions 2 of 2, theory of the firm

i. (Frank, Chapter 10, #5) A firm uses two inputs, K,L in its production process and finds that no matter how much output it produces or how input prices vary, it always minimizes its costs by buying only one or the other of the two inputs. Draw the firms isoquant map.

ii. (Frank, Chapter 10, #6) A firm that no matter how much output it produces and no matter how input prices vary, it always minimizes its costs by buying half as many units of capital as of labor. Draw the firms isoquant map.

iii. (Frank, Chapter 10, #7) A firm purchases capital and labor in competitive markets at prices of  $r=6$  and  $w=4$ , respectively. With the firm's current input mix, the marginal product of capital is 12 and the marginal product of labor is 18. Is this firm minimizing its costs? If so, explain how you know. If not, explain how the firm ought to do.

iv. (Varian, Chapter 19, #1) Prove that a profit-maximizing firm will always minimize costs.

v. (Varian, Chapter 19, #3) Suppose that a cost-minimizing firm uses two inputs that are perfect substitutes. If the two inputs are priced the same, what do the conditional factor demands look like for the inputs.

vi. (Varian, Chapter 19, #4) The price of paper used by a cost-minimizing firm increases. The firm responds to this price change by changing its demand for certain inputs, but it keeps its output constant. What happens to the firm's use of paper?

### D. Profit maximization

i. (Varian, Chapter 18, #1) In the short run, if the price of the fixed factor is increased, what will happen to profits?

ii. (Varian, Chapter 18, #6) If  $pMP_1 > w_1$ , then should the firm increase or decrease the amount of factor 1 in order to increase profit?

iii. (Varian, Chapter 18, #7) Suppose a firm is maximizing profits in the short run with variable factor  $x_1$  and fixed factor  $x_2$ . If the price of  $x_2$  goes down, what happens to the firm's use of  $x_1$ ? What happens to the firm's level of profits?

E. Describe the efficiency of product markets with perfect and imperfect competition. Use well-labeled graphs to complete your response.

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UNIVERSITY		Student Evaluation of Instruction Report						Call Number 05587 7	
Response rate* : 55.6% of 45 enrolled students		Were student ratings for this report collected on the web? No						Date of Report: 6/7/2010	
		Response scale is Likert-type with "5" being high and "1" being low.							
	N	1	2	3	4	5	N/A		
1. Well organized	25	0 %	0 %	20 %	40 %	40 %	0 %		
2. Intellectually stimulating	25	4	4	12	56	24	0		
3. Instructor interested in teaching	25	0	4	8	52	36	0		
4. Encouraged independent thinking	25	0	0	8	44	48	0		
5. Instructor well prepared	25	0	0	8	48	44	0		
6. Instructor interested in helping students	25	4	4	20	44	28	0		
7. Learned greatly from instructor	25	8	4	12	52	24	0		
8. Created learning atmosphere	25	0	8	12	56	24	0		
9. Communicated subject matter clearly	25	0	8	24	40	28	0		
10. Overall rating	25	0	8	8	48	36			
Your ratings are summarized below. When sufficient data exist, summaries are also provided for up to three reference groups. Your "comparison group" is based on the size of your class and the predominant reason students indicate they enrolled. Comparison group data are reported at both the college and university levels. Over the preceding 4 quarters,									
422 instructors and 1009 course sections were in your Comparison Group by College, and 2708 instructors and 6602 course sections were in your Comparison Group by University. Across all courses using the SEI instrument since 1994, 42.49% of them share the characteristics listed below. The Course-Offering Unit listing is not based on size or electivity; it is a summary of the SEI data across the previous four quarters in your department or school.									
Your comparison groups have the following qualities: Class size 20 to 80;									
Predominant reason given for enrolling in this course was that it was specifically required in the student's major/minor or that it fulfills a GEC/BER requirement.									
This Instructor	Comparison Group by College		Comparison Group by University		Course-Offering Unit				
Mean	Std Dev	Mean	Std Dev	Mean	Std Dev	Mean	Std Dev		
1. Instructor well organized	4.2	0.8	4.2	0.5	4.2	0.5	4.2	0.5	
2. Intellectually stimulating	3.9	1.0	4.0	0.5	3.9	0.5	3.8	0.6	
3. Instructor interested in teaching	4.2	0.8	4.4	0.4	4.4	0.5	4.3	0.5	
4. Encouraged independent thinking	4.4	0.6	4.2	0.5	4.2	0.5	4.0	0.5	
5. Instructor well prepared	4.4	0.6	4.3	0.5	4.3	0.5	4.3	0.5	
6. Instructor interested in helping students	3.9	1.0	4.3	0.5	4.3	0.5	4.2	0.5	
7. Learned greatly from instructor	3.8	1.1	3.9	0.6	3.9	0.6	3.8	0.7	
8. Created learning atmosphere	4.0	0.8	4.1	0.5	4.1	0.5	4.0	0.6	
9. Communicated subject matter clearly	3.9	0.9	4.0	0.6	4.0	0.6	3.8	0.7	
10. Overall rating	4.1	0.9	4.2	0.5	4.2	0.5	4.0	0.6	
Comparison Group by University Distribution of Mean Scores on Overall Rating (Item 10)									
20.0%									
15.0%									
								Group mean on Overall Rating = 4.2	
								Instructor mean on Overall Rating = 4.1	

## 5. Economic history, excerpts from long run wealth inequality Comparable Studies

Andrew Brimmer (1988) found that blacks held 7.2 percent of US aggregate income, but only 3 percent of US aggregate wealth in 1984. This large disparity in wealth have persisted throughout the twentieth century: Between 1940 and 1988, the black mean was 13 to 23 percent of white mean, and the black median 4 to 10 percent of white median (Wolff, 1992). But the origin of these differences has not been researched. Several studies (See, e.g., Pennsylvania Abolitionist Society 1838, Society of Friends 1849, Dubois, 1899, Jackson, 1939, Soltow, 1972, Soltow, 1975, Berlin, 1979, Higgs, 1982, Spriggs, 1984, Margo, 1984, Hornsby, 1989, Eggert, 1997, Hershberg, 1997, and Bodenhorst, 1999) have addressed historical differences in wealth. However, their results are often limited by non-representative local samples, small samples, or descriptive analyses that do not employ potential explanatory variables.

### *Contemporary Studies*

Researchers have also studied different aspects of white-black wealth differences using contemporary data. For instance, several studies have focused on white-black wealth differences due to differences in inheritance (See, e.g., Kotlikoff & Summers 1981, Menchik & Jianakopolis 1997, Wolff 1998, and Altonji, Doraszelski & Segal 2000). Other studies have focused on white-black wealth differences due to differences in income, savings and preferences (See, e.g., Terrell, 1971, Franklin & Smith, 1977, Oliver & Shapiro, 1989, Wolff, 1992, Oliver & Shapiro, 1997, Conley, 1999, Keister, 2000a, Keister, 2001, and Wolff, 2001). Additional studies have focused on white-black wealth differences due to

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differences in assets and homeownership (See, e.g., Terrell 1971, Birmbaum & Weston 1974, Brimmer 1988, Snyder 1989, Wolff 1992, Wolff 1998, Hurst, Luoh & Stafford 1998, Chiteji & Stafford 1999, and Keister 2000b).

Several studies attempt assess the dominant source of wealth and wealth differences. Kotlikoff & Summers (1981) produced a foundational study on aggregate wealth and found that intergenerational transfers were the most significant factor in wealth accumulation. Conely (1999) proposed that legal and class barriers were the source of black-white wealth difference, i.e. black codes in the south, coerced failure of Freedman's Bank in 1874, racial discrepancies in Old Age Insurance in 1935, redlining in HOLC in 1933, and redlining in Federal Housing Authority & Veterans Administration in 1937. Blau & Graham (1990) produced a seminal study of racial wealth inequality using regression decomposition. After controlling for income and demographic variables, they found that 78 percent of the wealth gap remained unexplained in 1976. These studies have made significant contributions to our understanding of economic discrimination in terms of modern wealth differences.

### *Historical Studies*

Lee Soltow (1972; 1975) conducted one of the first in-depth studies of overall mid-nineteenth century wealth accumulation patterns using the census population schedules. Note that these schedules were originally stored on microfilms. He spun the microfilm half-turns to collect random, cross-sectional samples from 1850-1870. Soltow used Gini coefficients to find that black wealth was less equally distributed among blacks than white wealth among whites. He finds that "their inequality levels are strangely similar in the sense that a few held wealth" (Soltow, 1975, p.145). Note that Soltow employs a small sample of 393 non-whites (1975) and 151 blacks (1972) to calculate his results.

Several studies have analyzed the experience blacks prior to the mass emancipation of southern slaves. John Hope Franklin (1943), Leon Litwick (1961) and Ira Berlin (1974) provide comprehensive accounts of free blacks. Furthermore, Philadelphia Abolitionist Society (1838), Society of Friends (1849), Dubois (1899), Eggert (1997) and Hershberg (1997) provided original studies on free black wealth in localities within Pennsylvania. Also, Bodenhorn (1999) studied racial inequality by analyzing wealth differences among darker and lighter free blacks in Maryland, Virginia, North Carolina, Kentucky and Louisiana. But free blacks were only two percent of the US population at any given time period.

Several studies have analyzed black-white wealth differences among in the south well after emancipation. Robert Higgs (1982), Robert Margo (1984) and Anne Hornsby (1989) used tax records to analyze southern black-white wealth differences between 1860 and 1915. They found strong yet limited wealth gains among blacks after emancipation although their results are limited the southern economy.

This study will build upon comparable, current and historical findings by analyzing white-black wealth differences directly after the Civil War and mass emancipation of southern slaves to obtain new insights into the historical and intertemporal dimensions of the white-black wealth gap.

## **6. Economic discrimination, classical versus institutional perspectives**

### *Classical Perspectives*

In general, discrimination is defined as "offering different opportunities to similar individuals who differ by color of skin, ethnicity, gender, age or other characteristic" (Mankiw, 1997, p. 408). Statistical discrimination implies "making predictions about a person based on membership in a certain group" (Stockton, 1999, p.434) or "using an individual's membership in a certain group as information on the individual's skill and productivity" (Borjas, 2000, p.357). These types of discrimination are quite different than economic discrimination.

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Gary Becker (1957) suggests that economic discrimination can be described as a ‘taste for discrimination,’ meaning the individual “must act as if he were willing to pay something, either directly or in the form of reduced income, to be associated with some persons instead of others...The money costs of a transaction do not always completely measure net costs and a discrimination coefficient acts as a bridge between money and net costs” (Becker, 1957, p.14).

Therefore, economic discrimination is either based on individual productivity differences or individual preferences for a member of a particular group. The remedy to the latter is promoting competition for market discipline to prevent sustaining such practices.

### *Institutional Perspectives*

The definition of economic discrimination is contingent upon one’s perspective of the organization of society: via the individual or the institution. Howard Sherman (1996) suggests that the latter viewpoint is based upon dividing social progress into:

“Institutional and technical processes. The institutions include all human relationships in the processes of production and distribution. These institutions thus include under capitalism the work relationship of workers and bosses, the corporate structure, the trade unions, the whole financial process, and so forth. These relationships or (non-preordained) processes can only be described for a single type of economy because evolution has witnessed various types of economies and will most likely witness many more in the future. Thus, the (institutionalist) must always be historically specific and must base its laws on the specific institutions of a specific society” (Sherman, 1996, p.40).

Therefore economic discrimination occurs when these human relationships lead to divisions where one group with at least one dominant factor, such as a population or resource majority, pursue an economically elevated position in a common society over the other group via the technical processes of the institutions.

### *Price of labor, wages, as a subset of wealth*

#### *The Purpose of Wealth*

The purpose of wealth has varied from over time. From an economics perspective, wealth is the accumulation of resources that have market value and can be liquidated for present and future consumption. This study proceeds based on the most measurable assumption: households reside in a country with a mixed economy of markets and social planning, such that they have an incentive to accumulate material wealth for intertemporal household consumption and social influence. The following sections present: (i) the determinants of wealth, (ii) a decomposition of wealth determinants into structural components and discrimination, and (iii) theoretical differences in average wealth between members of two groups.

Becker (1957) and Arrow (1972) developed the most general theories of wage discrimination and favoritism. Oaxaca (1973) and Blinder (1973) have mechanized their theories for empirical analysis. While their findings are insightful, they cannot be directly applied to studying wealth differences since wealth is a complex combination of wages and other variables.

## **7. Conclusion**

In summary, the lower boundary of the 99 percent confidence interval on the mean for unexplained effects remained above 72 percent for decompositions in all samples, based on the primary index and, at least, above 50 percent for decompositions in all samples, based on the alternative index. Furthermore, unexplained differences in states that abolished slavery just after the Civil War were 10 percent higher than unexplained effects in states that abolished slavery years before the Civil War. Finally, the magnitudes of the unexplained effects were similar over the long-run.

Therefore, we cannot reject the claim that, when comparing the wealth of disenfranchised to the wealth of the enfranchised, differences in wealth, due to

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unexplained effects, including discrimination, dominate the portion due to classical characteristic differences.

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