Appendix (For Online Publication)

Appendix I. Estimation of Earnings Process

We use data from the Panel Study of Income Dynamics (PSID) to estimate the earnings process. The estimated process for log residual earnings is used to calibrate the idiosyncratic productivity risk in the model.

Data: The PSID is a longitudinal survey of the representative sample of U.S. households in 1968. We use the surveys over the 1968-2007 period to estimate the earnings process. Beginning in 1997, the survey was conducted biennially, thus we use a total of 35 surveys. Our sample consists of male head of households between the ages of 25 and 59, who reported educational attainment, are not self-employed, and participated in the labor market (i.e., worked at least 260 hours), but worked no more than 5840 hours last year. We use head of household's labor income in the past year as our measure of earnings. Our sample also excludes observations with topcoded earnings or hourly wages less than half the federal minimum wage per hour, where hourly wage is obtained by dividing the annual labor income by past year's total annual hours worked. The resulting sample is an unbalanced panel.

Estimation: We model the log individual earnings as

The log earnings residual $\log(x_{t+1})$ is assumed to follow an AR(1) process:

$$\log(x_{i,t+1}) = \rho_x \log(x_{i,t}) + \eta_{i,t+1},$$

where ρ_x is the persistence and $\eta_{it} \sim (0, \sigma_{x,t}^2)$ is a shock whose variance $\sigma_{x,t}^2$ varies over time. The initial value of the log earnings residual is drawn from a time-invariant distribution: $x_1 \sim$

$(0, \sigma^2)$. We assume that variables, $\eta_{i,t}$ and x_1 are orthogonal and i.i.d. across individuals.

We estimate a parameter vector Φ, which includes two time-invariant parameters, ρ and λ, and a set of time-varying parameters $\{\lambda_t\}_{t=1967}^{2000}$. Since the PSID is available biennially starting in 1997, we estimate a total of 34 parameters. We have less information available to estimate the variances of the persistent wage shocks for more recent years, thus we use surveys after 2000 to improve our estimation although we do not estimate the variances for those years. Specifically, we use the data from the surveys after 2000 to construct covariances between years before and after 2000, as is done in **?**.

For each sample year t, we construct 10-year adjacent age cells from ages 29 to 54 such that, for instance, the age group 29 consists of those aged 25 to 34 years. We then compute the empirical autocovariance, $\widehat{g}_{a,t,n}^e$, of all possible orders for each age/year (a, t) cell in our PSID sample using log wage residuals $\widehat{x}_{i,t}^e$ from the first-stage regressions:

$$\widehat{g}_{a,t,n}^e = \frac{1}{I_{a,t,n}^e} \sum_{i=1}^{I_{a,t,n}^e} \widehat{x}_{i,t}^e\big|_{a_{it}=a} \cdot \widehat{x}_{i,t+n}^e\big|_{a_{it}=a}, \quad n \geqslant 0,$$

where $I_{a,t,n}^e$ is the number of observations for nth order autocovariance for age/year (a, t) cell in skill group e. We then pick the parameters $\widehat{\Phi}^e$ that minimize the equally weighted distance between this empirical autocovariance matrix and its theoretical counterpart:

$$\widehat{\Phi}^e = \arg\min_{\Phi^e} \left[\widehat{G}^e - G^e(\Phi^e)\right]' I \left[\widehat{G}^e - G^e(\Phi^e)\right],$$

where $\widehat{G}^e$ is a stacked vector of empirical autocovariances, $G^e(\Phi^e)$ is the theoretical counterpart, and I is an identity matrix.

Appendix II. Earnings and Wealth Distribution

In order to examine the model's implications on the distribution of wealth, we exploit the Survey of Consumer Finances (SCF). The SCF is a triennial survey on household finances that provides detailed information on households' income, assets, and liabilities. Unfortunately, the SCF is not available before 1983. Therefore, we exploit the Survey of Financial Characteristics of Consumers (SFCC) in 1962 for the initial steady state of the model calibrated to 1967 U.S. economy, while comparing the wealth distribution in the 2001 SCF with that in the new steady state of the model. Both surveys over-sample relatively wealthy households to improve the precision of the estimates for wealth and correct for a relatively higher nonresponse rate among wealthy households. Using both surveys, we measure household earnings and wealth.

Variables: We construct measures of earnings and wealth following **?**. All variables are measured at the households level. Earnings (E) is labor income plus a fraction of business income attributable to labor. Labor income is wages and salaries received in the past calendar year in both the 1962 SFCC and 2001 SCF. Business income includes income from sole proprietorship or profession, partnership, and farm in the 1962 SFCC, and includes income from professional practices, businesses, and farm sources in the 2001 SCF. The fraction of business income attributable to labor is determined based on the samplewide ratio of labor income to the sum of labor and capital income. Capital income includes dividend income, interest income, net income from rents and royalties, capital gains or losses from sale of securities and other assets, and income from trusts and estates in the 1962 SFCC, and includes non-taxable investments such as municipal bonds, other interest income, dividends, net gains or losses from the sale of stocks, bonds, and real estate, and net rent, trusts, or royalties in the 2001 SCF.

Wealth (W) is defined by net worth, i.e., assets minus debts. Assets include: residential assets and other real estates; net value of businesses; land contracts and notes; checking accounts; certificates of deposit, and other banking accounts; IRA/Keogh accounts; money market accounts; mutual funds; bonds and stocks; cash and call money at the stock brokerage; all annuities; trusts and managed investment accounts; vehicles; net cash value of life insurance policies; pension assets accumulated in accounts from current main job; total amount of loans owed to the households, and other assets. Residential assets are the current market value of primary residence, vacation homes and other residence for family use, owned by the household in the 1962 SFCC and the current market value of primary residence, not used for farming/ranching or investment, and the value of seasonal/vacation residence, and time-share ownership in the 2001 SCF. The net value of business assets is the market value of businesses plus debts owed by the businesses to the household minus debt owed by the household to the businesses. Pension assets in the 1962 SFCC include profit-sharing plans and retirement plans that could be withdrawn, whereas they include amounts accumulated in pension plans on the main job, tax-deferred savings, other pension or saving plan, and other future pension accounts in the 2001 SCF.

Debts include: housing debts on primary residence and other residence for family use; debts on investment real estates; installment debt; non-installment debt; other debts in the 1962 SFCC. In the 2001 SCF, debts include: housing debts, such as mortgages, home equity loans, and lines of credit; other residential and investment property debts; credit card debts; installment and non-installment loans; loans taken against pensions; margin loans; other miscellaneous debts. For all statistics, we use corresponding weights.

Our sample consists of households with positive earnings, i.e., E > 0. Since 1989, the

SCF imputes missing data using multiple methods and publish five implicates. For the 2001

SCF, we average all variables across the implicates.