The Macroeconomic Implications of Rising Wage Inequality in the United States

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Introduction – Motivation

- On the period 1970-2005, the wage structure of the US labor market has undergone major transformations :
    1. Sharp rise in the college wage premium
    2. Shrinkage of the men-women wage gap
    3. Large increase in residual dispersion of wage

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     - Within groups of workers (education, gender, age), the variance due to persistent or transitory ”experience” shocks increased
- What are the implications of this rise in inequality for the macroeconomy and welfare ?
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- What are the implications of this rise in inequality for the macroeconomy and welfare ?
    - New uninsured risks but new opportunities associated with the changing wage structure
- State-of-the-art model with
    - Incomplete markets : no state-contingent claims on income risks but one bond to self insure
    - OLG and life cycle dynamics
    - Education choice (return to college)
    - Labor supply decisions within two-persons households & matching

Changing wage structure - Model Inputs

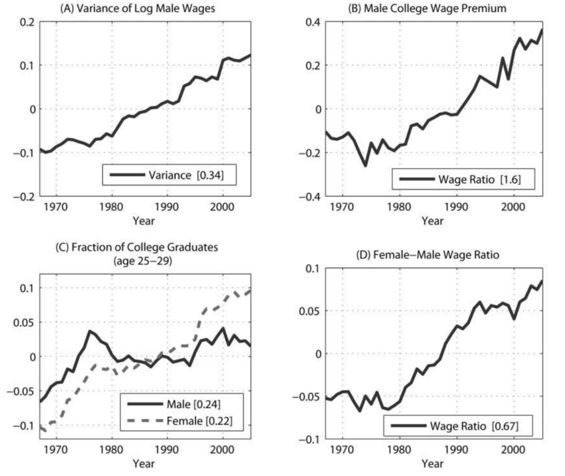

FIG. 1.—Cross-sectional facts: model inputs. All time series are demeaned, and means are reported in brackets within the legends. Source: CPS 1967–2005. Sample: Married households in which the husband is 25–59 years old. See Section II and Section A of the

Labor and consumption decisions - Model Targets

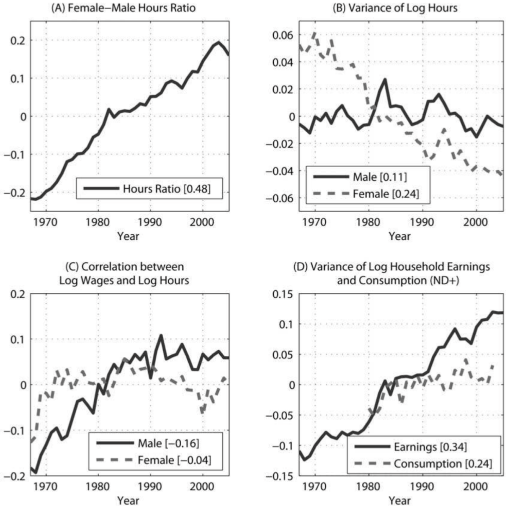

FIG. 2.—Cross-sectional facts: model targets. All time series are demeaned, and means are reported in brackets within the legends. Source: CPS 1967–2005 and CEX 1980–2003.

Model - 1 - Life cycle

- Labor demand : cf. Katz Murphy (1992) :

$$H_t = \Big\{ \lambda_t^S \left[\lambda_t^G H_t^{f,h} + \left(1 - \lambda_t^G\right) H_t^{m,h} \right]^{\frac{\theta-1}{\theta}} + \left(1 - \lambda_t^S\right) \left[\lambda_t^G H_t^{f,l} + \left(1 - \lambda_t^G\right) H_t^{m,l} \right]^{\frac{\theta-1}{\theta}} \Big\}^{\frac{\theta}{\theta-1}}$$

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- Life cycle from $j = 1$ (25 y.o.), retire in $j = 35$ (60 y.o.), death ζ^j
- Education choice for gender g, with cost $\kappa \sim F_t^g(\cdot)$

$$e_t^g(\kappa) = \begin{cases} h & \text{if } \mathbb{M}_t^g(h) - \kappa \geq \mathbb{M}_t^g(l) \\ l & \text{otherwise} \end{cases} \quad \Rightarrow \quad q_t^g = F_t^g\left(\mathbb{M}_t^g(h) - \mathbb{M}_t^g(l)\right)$$

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- Matching (couple/household formation in $j = 1$)

$$\mathbb{M}_t^m(h) = \pi_t^m(h,h)\mathbb{V}_t^0(h,h) + \pi_t^m(h,l)\mathbb{V}_t^0(h,l),$$

$\mathbb{V}_t^0\left(e^m, e^f\right)$: expected lifetime utility for couple of educat° $\left(e^m, e^f\right)$

Model - 2 - Earning risk

- Wage dynamics for gender g and educ. e :

$$\underbrace{p_t^{g,e}}_{\text{price per unit}} \times \underbrace{\exp\left[L(j) + y_t\right]}_{\varepsilon\left(j,\mathbf{y}_t^g\right)\text{efficiency units}}$$

$$p_t^{m,h} = MPL_{m,h} = \Omega_t^h(1-\lambda_t^G)\lambda_t^S \qquad \text{Labor price}$$

$$y_t = \eta_t + v_t \qquad \text{Trans risk} \qquad \mathbb{V}\text{ar}(v_t) = \lambda_t^v$$

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  - Idiosyncratic risk, incomplete market, self-insurance with bond a at rate r, with
- Closing the model with government taxes (τ^n, τ^a) pension benefit b and spending G_t, + Small open economy to set r exogenously

Model - 3

- Dynamic programming problem (perfect foresight for λ's)

$$\mathbb{V}_t\Big(e^m, e^f, j, a_t, \mathbf{y}_t^m, \mathbf{y}_t^f\Big) = \max_{c_t, n_t^m, n_t^f} u\big(c_t, n_t^m, n_t^f\big) + \beta\zeta^j \mathbb{E}_t\Big[\mathbb{V}_{t+1}\Big(e^m, e^f, j+1, a_{t+1}, \mathbf{y}_{t+1}^m, \mathbf{y}_{t+1}^f\Big)\Big]$$

$$\text{s.t.} \quad c_t + \zeta^j a_{t+1} = \big[1 + (1-\tau^a)r\big]a_t + (1-\tau^n)\Big[p_t^{m,e}\varepsilon(j, \mathbf{y}_t^m)n_t^m + p_t^{f,e}\varepsilon(j, \mathbf{y}_t^f)n_t^f\Big]$$

$$a_{t+1} \geq \underline{a}, \quad c_t \geq 0, \quad n_t^m, n_t^f \in [0,1]$$

with expected lifetime value for each spouse :

$$\mathbb{V}_t^0\left(e^m, e^f\right) = E\left[\mathbb{V}_t\left(e^m, e^f, 1, 0, \mathbf{y}_t^m, \mathbf{y}_t^f\right)\right]$$

and period return : $u(c, n^m, n^f) = \frac{c^{1-\gamma}}{1-\gamma} + \psi\frac{(1-n^m)^{1-\sigma}}{1-\sigma} + \psi\frac{\left(1-n^f\right)^{1-\sigma}}{1-\sigma}$

with $1/\sigma$ Frish elasticity & intra HH substitution of labor

Estimation of trends and shocks processes

- Measurement of residual shocks from PSID :

$$\ln w_{i,j,t} = \beta_t^0 + \beta_t^1 e_i + L(j) + y_{i,j,t}$$

  to measure λ_t^v and λ_t^ω
- Sequences of demand shifts λ_t^S and λ_t^G to match the male college wage premium and the gender wage gap
- Other parameters calibrated (matching moments)

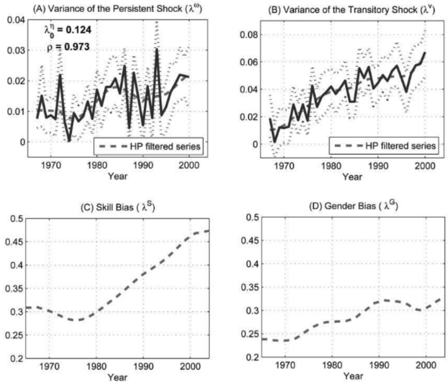

FIG. 3.—*A* and *B*, Variances of persistent and transitory wage shocks estimated from the PSID, 1967–2000. Each panel reports point estimates for the variances (solid line) and bootstrapped standard errors based on 500 replications (dotted lines). See Section B of the Appendix for details. *C* and *D*, Results of the internal calibration for skill- and gender-biased demand shifts. The paths for these two variables allow the model to replicate the empirical college wage premium and gender wage gap reported in figure 1*B* and *D*. See Section IV.C for details. This figure displays all four components of the {λ_t} sequence.

Result - Can the wage structure explain labor supply data

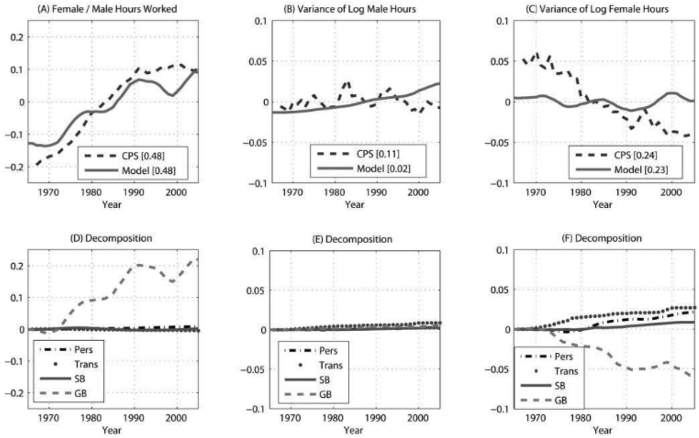

FIG. 4.—Model-data comparison and decomposition. *A*, *B*, and *C*, The female-male hours ratio and the dispersion in log hours worked for males and females. Both model and data series are demeaned, and means are reported in brackets within the legends. *D*, *E*, and *F*, The corresponding variable (the one in the panel immediately above) in all four model counterfactuals when we let the components of $\{\lambda_t\}$ vary one at a time. The labels in the legend refer to the specific component turned on in the experiment. "Pers" denotes the variance of the persistent shock, "Trans" the variance of the transitory shock, "SB" skill-biased demand shifts, and "GB" gender-biased demand shifts.

Welfare Implication

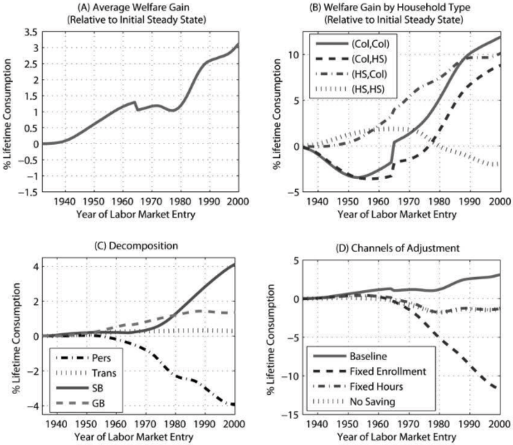

FIG. 7.—*A*, The average welfare gain from the changing wage structure, cohort by cohort (see Sec. VI.A for details on the calculation). *B*, The average welfare gain by household type. *C*, The average welfare gain in each of the four model counterfactuals when we let the components of $\{\lambda_t\}$ vary one at a time. *D*, The average welfare gains in the baseline and in the counterfactuals in which agents' choices are restricted. See Section VI.C for

Conclusion

- Sharp rise in wage inequality in the US
  - Demand shifts and increase in residual wage risk
- Analysis through a rich structural model matching the change in the wage structure
- Change in behaviors :
  - College enrollment, increase in female labor supply
  - Stable variance in hours and limited increase in variance of consumption

$\Rightarrow$ Welfare gains ($\sim 2\%$ lifetime consumption)

Other results

- Can wage structure explain wage & hour correlation (male/female)
  - Yes but for women, you need to add an increase in variance in wage that doesn't match the fall in variance in hours (above)
- Can wage structure explain the increase in variance in earnings and consumption
  - Yes, mostly due to increase in skill bias + increase in persistent risk
- Measurement of welfare ϕ_t : consumption equivalent to rescale consumption, risk and hours worked into a single unit
- Comparison : perfect foresight about λ's vs. myopic transition
  - Welfare gain much lower in the 70s-80s due to decreased enrollment

Correlation wages - hours

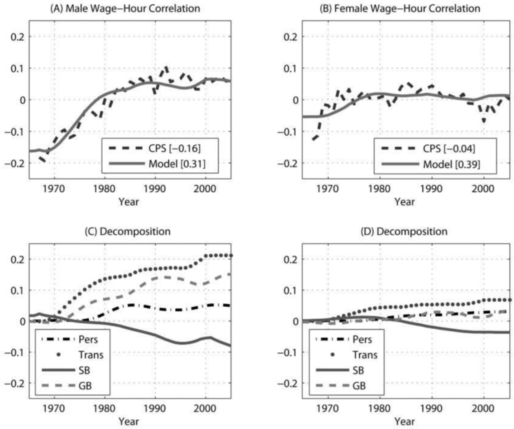

FIG. 5.—Model-data comparison and decomposition. *A* and *B*, The correlations between log wages and log hours for men and women. Both model and data series are demeaned, and means are reported in brackets within the legends. *C* and *D*, The corresponding variable (the one in the panel immediately above) in all four model counterfactuals when we let the components of $\{\lambda_t\}$ vary one at a time. The labels in the legend refer to the specific component turned on in the experiment. "Pers" denotes the variance of the persistent shock, "Trans" the variance of the transitory shock, "SB" skill-biased demand

Variance in earning and consumption

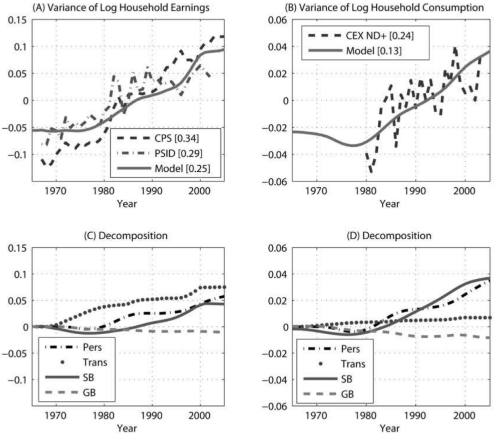

FIG. 6.—Model-data comparison and decomposition. *A* and *B*, The dispersion in log household earnings and log consumption. Both model and data series are demeaned, and means are reported in brackets within the legends. *C* and *D*, The corresponding variable (the one in the above panel) in all four model counterfactuals when we let the components of $\{\lambda_t\}$ vary one at a time. The labels in the legend refer to the specific component turned on in the experiment. "Pers" denotes the variance of the persistent shock, "Trans" the variance of the transitory shock, "SB" skill-biased demand shifts, and

Measurement of welfare

- Measurement of welfare ϕ_t : consumption equivalent to rescale consumption, risk and hours worked into a single unit

$$2\mathbb{E}_t \left\{ \sum_{j=0}^{J-1} \beta^j \bar{\zeta} u\left(c_{t+j}, n_{t+j}^m, n_{t+j}^f\right) \Big| e^m, e^f \right\} - \sum_{g \in \{m,f|} I_{\{e^g = h\}} \mathbb{E}_* \left[\kappa | \kappa \leq \hat{\kappa}_t^g \right]$$

$$= 2\mathbb{E}_* \left\{ \sum_{j=0}^{J-1} \beta^j \bar{\zeta}^j u\left((1+\phi_t) c_{*j}, n_{*j}^m, n_{*j}^f\right) \Big| e^m, e^f \right\} - \sum_{e \in |m,f\}} I_{\{e^g = h\}} E_* \left[\kappa \Big| \kappa \leq \hat{\kappa}_*^g \right.$$