From Income to Consumption: The Distributional Dynamics of Inequality

African Econometric Society Conference

Abuja

July 2009

Richard Blundell

(University College London and Institute for Fiscal Studies)

slides and references on my website:

http://www.ucl.ac.uk/~uctp39a/

Setting the Scene

- My aim in this lecture is to answer three questions:
  - How well do families insure themselves against adverse shocks?
  - What mechanisms are used?
  - How well does the 'standard' heterogeneous agents, incomplete markets model match the data?
- Show how the *panel data distributional dynamics of wages, earnings, income and consumption* can be used to uncover the answer to these questions.

Setting the Scene

- Inequality has many dimensions:
  - wages, income and consumption
- The link between the various types of inequality is mediated by multiple 'insurance' mechanisms
  - including adjustment in assets, family labour supply, taxes and transfers, informal contracts and gifts, etc
- Draw on two background papers:
  - Blundell, Pistaferri and Preston, AER, 2008 (BPP)
  - and Blundell, Low and Preston, IFS, 2008 (BLP)
- Extend the results in my Econometric Society lecture
- http://www.ucl.ac.uk/~uctp39a/

'Insurance' mechanisms…

Wages→ earnings→ joint earnings→ income→ consumption

hours

Family labour supply

Taxes and transfers

Self-insurance/ partial-insurance/ advance information

• These mechanisms will vary in importance across different types of households at different points of their life-cycle and at different points in time.

‘Insurance’ mechanisms…

- The manner and scope for insurance depends on the durability of income shocks and access to credit markets
- The objective of this research is to understand the distributional dynamics of earnings, income and consumption
- Illustrate with some key episodes in the US, UK, and elsewhere =>

Figure 1a: Inequality Episodes in the UK

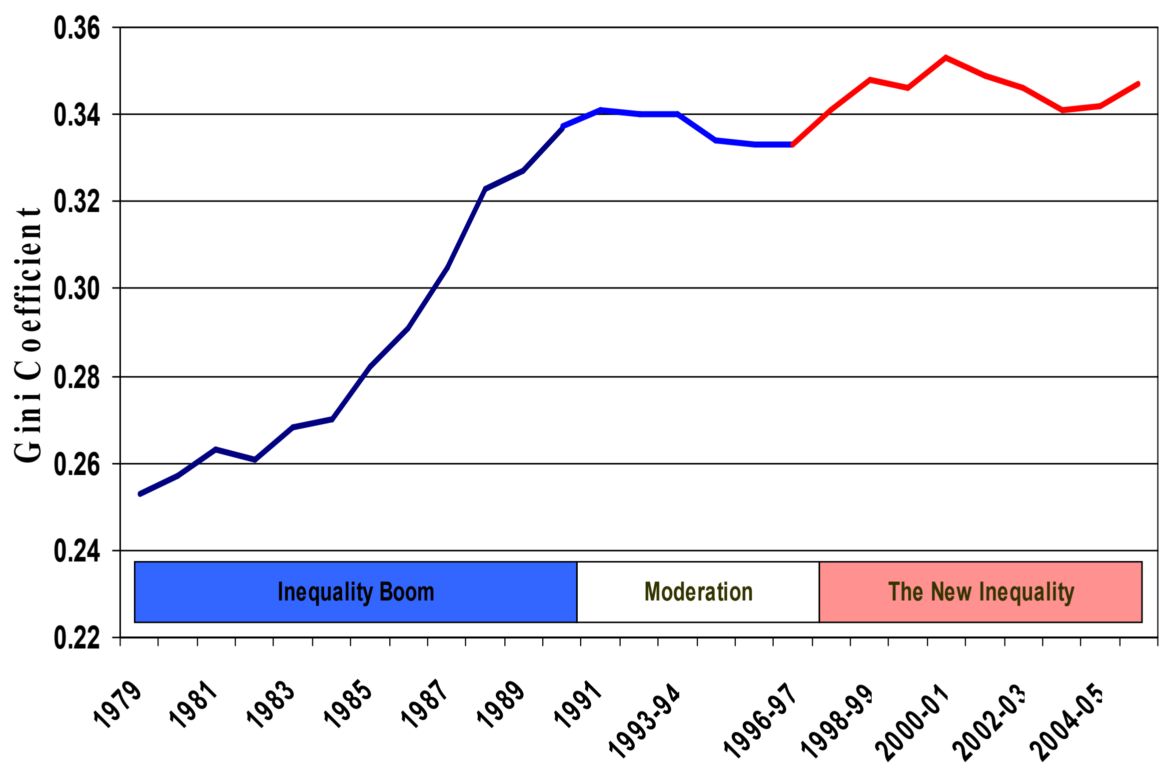


Figure 1b: World Inequality

	Gini index	GE(0)*	90th/10th percentile ratio
Middle East and North Africa	0.37	0.25	5.12
Sub-Saharan Africa	0.46	0.31	6.63
Latin America and Caribbean	**0.50**	**0.50**	**14.42**
South Asia	0.33	0.18	4.12
East Asia and Pacific	0.39	0.25	4.92
Europe and Central Asia	0.31	0.16	4.17
High-income OECD	0.31	0.17	4.09

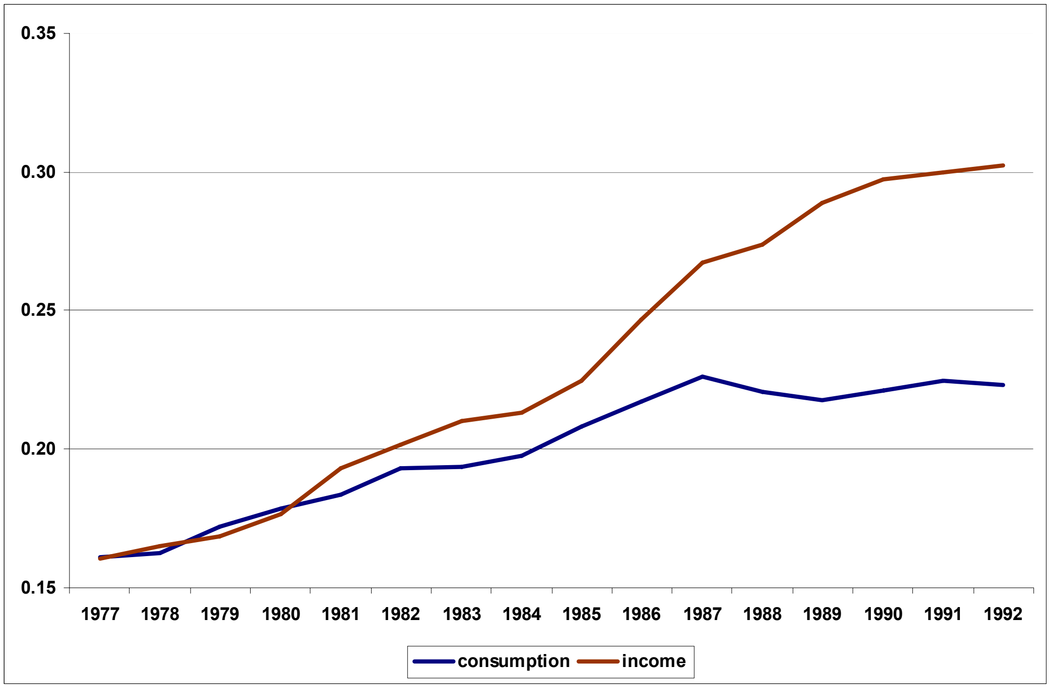
Source: World Bank (2005)

Figure 1c: Inequality in 5 African Economies

	Years	Per capita GDP in interna-tional $	Per cap. consump. in internat. (current $)	Gini coefficient				90th/10th percentile ratio	
				Per capita consumption		Per capita income		Per cap. cons.	Per cap. inc.
			Authors' calculations	WIDER	Author s' calcu-lations	WIDER	Author s' calcu-lations	Authors' calculations	
Côte d'Ivoire	1985-1988	1724[a*] 1952[b*]	1517[c] (678[**])	0.39[d*] 0.49[e*]	0.42	-	0.56	6.0	11.4
Ghana	1988	1035[a] 997[b]	770[c] (308)	0.35[d]	0.36	0.51[d]	0.46	4.9	9.1
Guinea	1994	514[a] 2063[b]	1372[c] (251)	0.55[d]	0.48	-	0.59	9.5	15.4
Madagascar	1993	709[a] 780[b]	303[c] (102)	0.49[d]	0.47	0.63[d]	0.53	8.2	11.0
Uganda	1992	574[a] 614[b]	464[c] (113)	0.39[d] 0.48[e]	0.44	0.52[d]	0.49	6.3	7.7

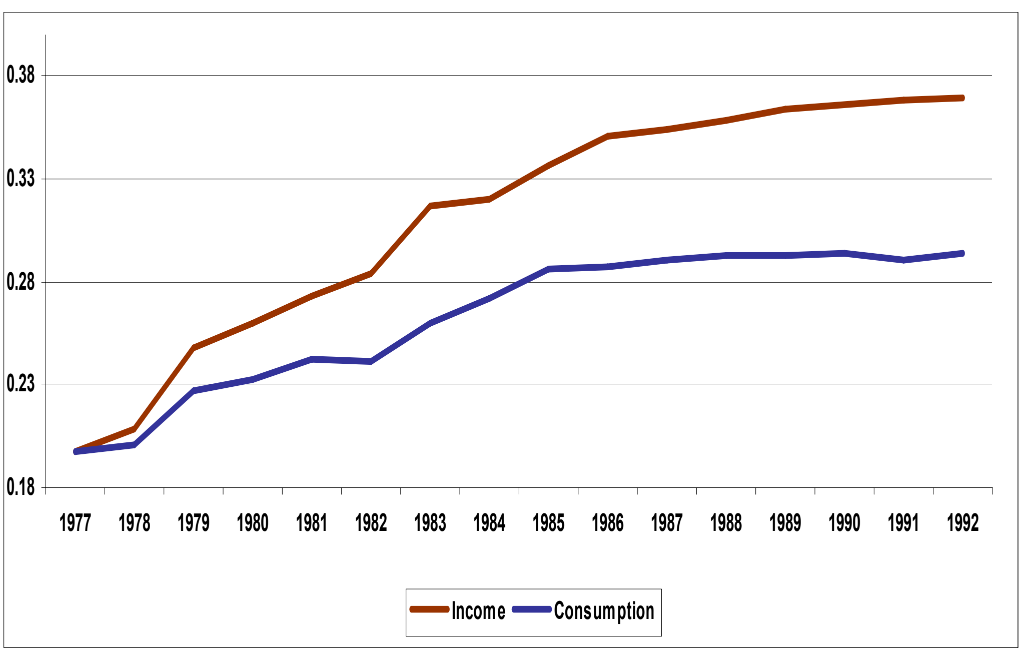
Source: Inequalities and equity in Africa, *Denis COGNEAU et al (2006)*

Figure 1e: Income and Consumption Inequality in the UK



Author's calculations.
Variance of log equivalised, cons rebased at 1977, smoothed.

Figure 1f: Income and Consumption Inequality in the US



Source: Blundell, Pistaferri and Preston (2005) : CEX/PSID
Variance of log equivalised, cons rebased at 1977, smoothed

This research is an attempt to reconcile three key literatures

I. Examination of inequality over time in consumption and in income
   - In particular, early work in the US by Cutler and Katz (1992) and in the UK by Blundell and Preston (1991) and Atkinson (1997), etc

This research is an attempt to reconcile three key literatures

I. Examination of inequality over time via consumption and income

II. Econometric work on the panel data decomposition of the income process
   - Lillard and Willis (1978), Lillard and Weiss (1979), MaCurdy(1982), Abowd and Card (1989), Gottschalk and Moffitt (1995, 2004), Baker (1997), Dickens (2000), Haider (2001), Meghir and Pistaferri (2004), Browning, Ejrnes and Alvarez (2002, 2007), Haider and Solon (2006), etc

This research is an attempt to reconcile three key literatures

I. Examination of inequality over time via consumption and income

II. Econometric work on panel data income dynamics

III. Work on intertemporal decisions under uncertainty, especially on partial insurance, excess sensitivity:

- Hall and Mishkin (1982), Campbell and Deaton (1989), Cochrane (1991), Deaton and Paxson (1994), Attanasio and Davis (1996), Blundell and Preston (1998), Krueger and Perri (2004, 2006), Heathcote et al (2005), Storresletten et al (2004), Attanasio and Pavoni (2006), etc

- information and human capital:
  - Cuhna, Heckman and Navarro (2005), Cuhna and Heckman (2007), Guvenen (2006) and Huggett, et al (2007)

What do we know about income dynamics?

'General' specification for income dynamics for individual *i* of age *a* in time period *t*

$$\ln Y_{i,a,t} = Z_{i,a,t}'\lambda + B_{i,a,t}'f_i + y^P_{i,a,t} + v_{i,a,t}$$

$$y^P_{i,a,t} = \rho y^P_{i,a-1,t-1} + \zeta_{i,a,t}$$

- y^P is a persistent process which adds to the individual-specific trend term $B_{i,a,t}`f_i$
- transitory process v represented by some low order MA
- allow variance of permanent and transitory shocks, var(ζ) and var(v), to vary with cohort, time,..
- for any birth cohort, a useful specification

$$B_{i,t}'f_i = p_t f_{1i} + f_{0i}$$

Idiosyncratic trends

The term $p_t f_{1i}$ could take a number of forms:

(a) deterministic trend: $p_t = r(t)$ where r is known

(b) stochastic trend in 'ability prices': $p_t = p_{t-1} + \xi_t$, $E_{t-1}\xi_t = 0$

- Evidence points where each is of key importance:

  (a) early in working life (Solon et al.) - a life-cycle effect.

  (b) during periods of technical change when skill prices are changing across the unobserved ability distribution. As in the early 1980s in the US and UK - a calendar time effect.

- These can have important implications for the distribution of consumption growth rates and I have various sensitivity results for ρ and $p_t f_{1i} + f_0$

Figure 2: Haider and Solon (AER, 2006)

Estimates of λ_t

λ_t is the slope coefficient in the regression of current log earnings on the log of the present value of lifetime earnings

What do we know about income dynamics?

- General specification:

$$y_{i,a,t} = Z_{i,a,t}^{'}\lambda + p_t f_{1i} + f_{0i} + y_{i,a,t}^{P} + v_{i,a,t}$$

$$\text{with} \qquad y_{i,a,t}^{P} = \rho y_{i,a-1,t-1}^{P} + \zeta_{i,a,t}$$

$$\text{and} \qquad v_{i,a,t} = \sum_{j=0}^{q} \theta_j \varepsilon_{i,a-j,t-j} \text{ and } \theta_0 \equiv 1.$$

- this implies a simple structure for the autocovariance function of the *quasi-differences* of *(y - Z'λ)*.
- e.g. with *q=1:*

$$\mathrm{cov}(\Delta^{\rho} y_t \Delta^{\rho} y_{t-2}) = \mathrm{var}(f_0)(1-\rho)^2$$

$$+ \mathrm{var}(f_1)\Delta^{\rho} p_t \Delta^{\rho} p_{t-2} - \rho\theta_1 \mathrm{var}(\varepsilon_{t-2})$$

where $\Delta^{\rho} = (1-\rho L)$ is the quasi-difference operator

What do we know about income dynamics?

- Note that for ρ close to unity and small θ_1

$$\mathrm{cov}(\Delta y_t, \Delta y_{t-2}) \simeq \mathrm{var}(f_1)\Delta p_t \Delta p_{t-2}$$

- Tables Ia & Ib of the autocovariances from various panel data on income

Table Ia: The Auto-Covariance Structure of Income

Year	Var (Δy_t) est.	Var (Δy_t) s.e.	Cov ($\Delta y_{t+1} \Delta y_t$) est.	Cov ($\Delta y_{t+1} \Delta y_t$) s.e.	Cov ($\Delta y_{t+2} \Delta y_t$) est.	Cov ($\Delta y_{t+2} \Delta y_t$) s.e.
1979	0.0801	*0.0085*	-0.0375	*0.0077*	0.0019	*0.0037*
1980	0.0830	*0.0088*	-0.0224	*0.0041*	-0.0019	*0.0030*
1981	0.0813	*0.0090*	-0.0291	*0.0049*	-0.0038	*0.0035*
1982	0.0785	*0.0064*	-0.0231	*0.0039*	-0.0059	*0.0029*
1983	0.0859	*0.0092*	-0.0242	*0.0041*	-0.0093	*0.0053*
1984	0.0861	*0.0059*	-0.0310	*0.0038*	-0.0028	*0.0038*
1985	0.0927	*0.0069*	-0.0321	*0.0053*	-0.0012	*0.0042*
1986	0.1153	*0.0120*	-0.0440	*0.0094*	-0.0078	*0.0061*
1987	0.1185	*0.0115*	-0.0402	*0.0052*	0.0014	*0.0046*
1988	0.0930	*0.0084*	-0.0314	*0.0041*	-0.0017	*0.0032*
1989	0.0922	*0.0071*	-0.0303	*0.0075*	-0.0010	*0.0043*
1990	0.0988	*0.0135*	-0.0304	*0.0058*	-0.0060	*0.0046*

Variance of log, PSID: after tax total labour income

What do we know about income dynamics?

- Simple permanent – transitory representation
- Note that for ρ close to unity and MA(1) transitory shocks

$$y_{i,a,t} = f_{0i} + y^P_{i,a,t} + v_{i,a,t}$$

where $$y^P_{i,a,t} = y^P_{i,a-1,t-1} + \zeta_{i,a,t}$$

and $v_{it} = \varepsilon_{it} + \theta_j \varepsilon_{\text{it-1}}$.

- implies following structure for the autocovariances

$$\text{cov}(\Delta y_t \Delta y_{t-2}) = -\theta_1 \text{ var}(\varepsilon_{t-2})$$
$$\text{cov}(\Delta y_t \Delta y_{t-s}) = 0 \text{ for } s > 2$$

What do we know about income dynamics?

Table Ia: The Autocovariance Structure of Income - US

Test $cov(\Delta y_{t+1}, \Delta y_t) = 0$ for all t: p-value 0.0048
Test $cov(\Delta y_{t+2}, \Delta y_t) = 0$ for all t: p-value 0.0125
Test $cov(\Delta y_{t+3}, \Delta y_t) = 0$ for all t: p-value 0.6507
Test $cov(\Delta y_{t+4}, \Delta y_t) = 0$ for all t: p-value 0.9875

- forecastable components and differential trends are most important early in the life-cycle
- age selection (Haider and Solon, AER 2006) - the slope coefficient in the regression of current log earnings on the log of the present value of lifetime earnings: λ_t

Table Ib: The Autocovariance Structure of Income - UK

Year	var(Δyt)	cov(Δyt,Δyt+1)	cov(Δyt,Δyt+2)	cov(Δyt,Δyt+3)
1992	0.1429	-0.0504	-0.0080	-0.0044
	(.0071)	(.0048)	(.0042)	(.0039)
1993	0.1138	-0.0304	-0.0029	0.0010
	(.0054)	(.0039)	(.0034)	(.0031)
1994	0.1104	-0.0293	0.0027	-0.0098
	(.0052)	(.0034)	(.0029)	(.0036)
1995	0.1108	-0.0323	0.0011	-0.0011
	(.0052)	(.0032)	(.0031)	(.0029)
1996	0.0946	-0.0279	-0.0013	0.0018
	(.0042)	(.0031)	(.0027)	(.0028)
1997	0.1051	-0.0295	-0.0023	0.0016
	(.0047)	(.0032)	(.0028)	(.0028)
1998	0.0978	-0.0289	-0.0037	-0.0002
	(.0045)	(.0031)	(.0029)	(.0029)
1999	0.0986	-0.0291	-0.0026	0.0014
	(.0045)	(.0035)	(.0031)	(.0031)
2000	0.1039	-0.0267	-0.0002	0.0042
	(.0049)	(.0034)	(.0031)	(.0031)
2001	0.1025	-0.0325	-0.0097	0.0039
	(.0051)	(.0037)	(.0033)	(.0036)
2002	0.0994	-0.0261	-0.0048	-
	(.0049)	(.0036)	(.0032)	-
2003	0.1082	-0.0312	-	-
	(.0059)	(.0041)	-	-
2004	0.1107	-	-	-
	(.0058)	-	-	-

Source: Blundell and Etheridge (2007)
Variance of equivalised income, BHPS

What do we know about income dynamics?

$$\Delta y_{it} = \zeta_{it} + \Delta v_{it}, \text{ where } \Delta y_{it} = \Delta \ln Y_{it} - \Delta Z_{it}'\lambda_t$$

- allows for general fixed effects and initial conditions
- regular deconvolution arguments lead to identification of variances and complete distributions, e.g. Bonhomme and Robin (2006)

the key idea is to allow the variances (or loadings) of the factors to vary nonparametrically with cohort, education and time:

- the degree of persistence depends on the ***relative*** size of these variances
- this provides a measure of the durability of income shocks

The self-insurance model of consumption choices

$$\max E_t \sum_{j=0}^{T-t} \frac{1}{(1+\delta)^j} \frac{C_{it+j}^{\beta} - 1}{\beta} e^{Z_{it+j}\vartheta}$$

- Individuals and families can self-insure using a simple credit market (risk-free bond)
- Consumption and income are linked through the intertemporal budget constraint

$$A_{t+j+1} = (1 + r_{t+j})(A_{t+j} + Y_{t+j} - C_{t+j})$$

$$A_T = 0$$

Consumption dynamics

- With CRRA preferences, the Euler equation is:

$$C_{it}^{\beta-1} = \frac{1+r_t}{1+\delta} E_t e^{\Delta Z_{it+1}\vartheta} C_{it+1}^{\beta-1}$$

- We show that this can be approximated by:

$$\Delta \ln C_{it} \approx \Gamma_{it} + \Delta Z_{it}\,'\vartheta + \pi_{it}\zeta_{it} + \gamma_{tL}\pi_{it}\varepsilon_{it} + \xi_{it}$$

Impatience, precautionary savings, intertemporal substitution

Deterministic preference shifts and labor supply non-separabilities

Impact of permanent income shocks

Impact of transitory income shocks, $\gamma<1$

Impact of shocks to higher income moments,etc

- CRRA preferences ensures Γ_t is independent of C_{t-1}

Self-insurance and Partial Insurance

- In this model, self-insurance is driven by the parameter π, which corresponds to the ratio of human capital wealth to total wealth (the sum of financial and human capital wealth)
- Individuals approaching retirement have a lower value of π
- Under some circumstances, it is possible to insure consumption fully against income shocks but *Moral hazard*, *Limited enforcement,* etc.
- Introduce ‘partial insurance’ to capture the possibility of ‘excess insurance’ and also ‘excess sensitivity’.

Consumption dynamics (2)

Need to generalise to account for additional 'insurance' mechanisms and excess sensitivity

$$\Delta \ln C_{it} \approx \Gamma_{it} + \Delta Z_{it}'\vartheta + \phi_t \zeta_{it} + \psi_t \varepsilon_{it} + \xi_{it}$$

Partial insurance coefficient w.r.t. *permanent* shocks, $0 \le \phi \le 1$

Excess sensitivity coefficient w.r.t. *transitory* shocks, $0 \le \psi \le 1$

- In this notation, the transmission parameters φ and ψ subsume π and γ from the self-insurance model
- This factor structure provides the key panel data moments that link the evolution of distribution of consumption to the evolution of labour income distribution
- It describes how consumption updates to income shocks

Panel Data Moments

$$\operatorname{var}(\Delta y_{it}) = \operatorname{var}(\zeta_{it}) + \operatorname{var}(\Delta \varepsilon_{it})$$

$$\operatorname{cov}(\Delta y_{it}, \Delta y_{it+1}) = -\operatorname{var}(\varepsilon_{it})$$

$$\operatorname{var}(\Delta c_{it}) = \phi_t^2 \operatorname{var}(\zeta_{it}) + \psi_t^2 \operatorname{var}(\varepsilon_{it}) + \operatorname{var}(\xi_{it}) + \operatorname{var}(u_{it}^c)$$

$$\operatorname{cov}(\Delta c_{it}, \Delta c_{it+1}) = -\operatorname{var}(u_{it}^c)$$

$$\operatorname{cov}(\Delta c_{it}, \Delta y_{it}) = \phi_t \operatorname{var}(\zeta_{it}) + \psi_t \operatorname{var}(\varepsilon_{it})$$

$$\operatorname{cov}(\Delta c_{it}, \Delta y_{it+1}) = -\psi_t \operatorname{var}(\varepsilon_{it})$$

Identification and Robustness

- There are additional moments providing overidentifying restrictions and allowing for measurement error in BPP
- BPP also show identification in the nonstationary case and develop an IV analogy
- To assess the robustness of the approach use stochastic simulation model…. Kaplan and Violante (2009) and BLP.
- BLP consider identification with repeated cross-sections.

Panel Data Application

- CEX: Provides consumption and income, but it's not a panel
- PSID: Provides panel data on income and earnings but limited information on consumption (food)
  - Use a structural demand relationship for food in the CEX (monotonic)

$$\ln f_{it} = Z_{it}'\gamma + \beta_t' Z_{it} \ln C_{it} + \ln p_t'\nu + e_{it}$$

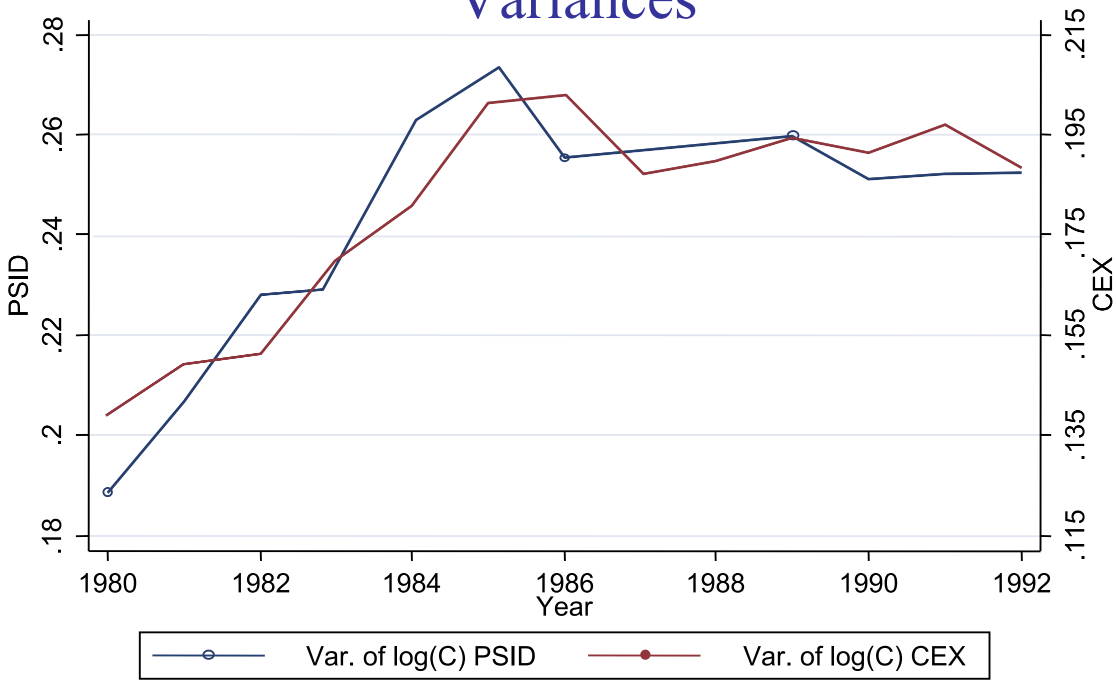
  - Conditioning on Z allows for non-separabilities with demographics and labour supply

- It can be inverted in the PSID to obtain an imputed measure of consumption

Panel Data Application

- PSID 1968-1996: (main sample 1978-1992)
  - Construct all the possible panels of 5 ≤ length ≤ 15 years
  - Sample selection: male head aged 30-59, no SEO/Latino subsamples
- CEX 1980-1998: (main sample 1980-1992)
  - Focus on 5-quarters respondents only (annual expenditure measures)
  - Sample selection similar to the PSID
- A comparison of both data sources is in Blundell, Pistaferri and Preston (2004).

Does the method work? (2) Variances



Source: Blundell, Pistaferri and Preston (2004)

Figure 3 Results: Variance of permanent shocks

Figure 4 Results: Variance of permanent shocks

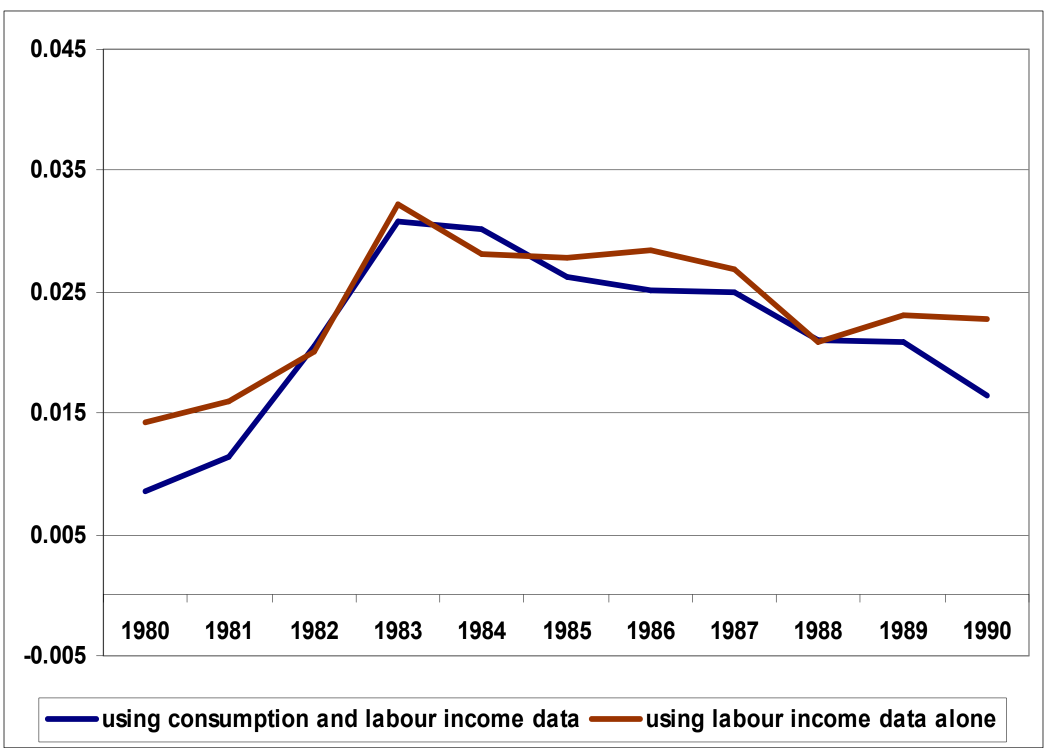


Figure 5 Results: Variance of transitory shocks

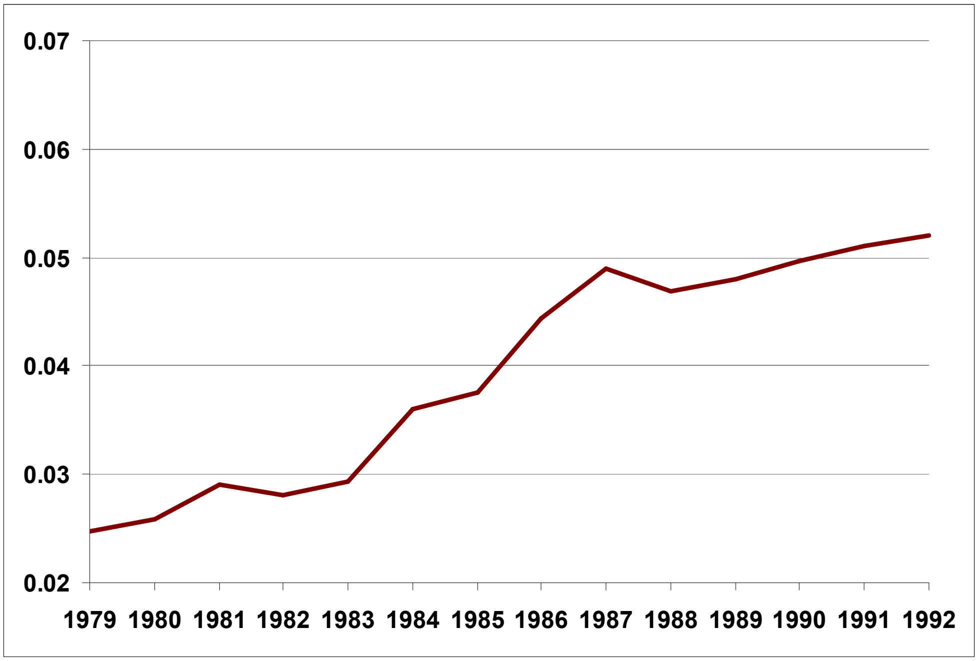


Table II Results: College and Cohort Decomposition

	Whole sample	George W. Bush cohort (born 1940s)	Donald Rumsfeld cohort (born 1930s)	Low educ.	High educ.
Var. measur. error	0.0632 (0.0032)	0.0582 (0.0049)	0.0609 (0.0061)	0.0753 (0.0055)	0.0501 (0.0032)
Var. preference shocks	0.0122 (0.0038)	0.0151 (0.0064)	0.0164 (0.0073)	0.0117 (0.0067)	0.0156 (0.0042)
Transmission Coeff. perm. shock (ϕ)	0.6423 (0.0945)	0.7445 (0.2124)	0.5626 (0.2535)	0.8211 (0.2232)	0.4262 (0.0867)
Transmission Coeff. trans. shock (ψ)	0.0533 (0.0335)	0.0845 (0.0657)	0.0215 (0.0592)	0.0869 (0.0517)	0.0437 (0.0513)

Additional 'Insurance'

- Individual and family labor supply
  - Stephens; Heathcote, Storesletten and Violante; Attanasio, Low and Sanchez-Marcos; etc
- Redistributive mechanisms: social insurance, transfers, progressive taxation
  - Gruber; Gruber and Yelowitz; Blundell and Pistaferri; Kniesner and Ziliak; etc
- Family and interpersonal networks
  - Kotlikoff and Spivak; Attanasio and Rios-Rull
- Durable replacement
  - Browning and Crossley

Family Labour Supply

- Total income Y_t is the sum of two sources, Y_{1t} and $Y_{2t} \equiv W_t h_t$
- Assume the labour supplied by the primary earner to be fixed. Income processes:

$$\Delta \ln Y_{1t} = \gamma_{1t} + \xi_{1t} + \Delta v_{1t}$$
$$\Delta \ln W_t = \gamma_{2t} + \xi_{2t} + \Delta v_{2t}$$

- Household decisions, baseline model:

$$\Delta \ln C_t \simeq \sigma_t \Delta \ln \lambda_t$$
$$\Delta \ln h_t \simeq \rho_t [\Delta \ln \lambda_t + \Delta \ln W_t]$$
with $\sigma \equiv U'/CU'' < 0$, $\rho \equiv V'/hV'' > 0$

Family Labour Supply

- The key panel data moments become:

$$Var(\Delta c_t) \simeq \beta^2\sigma^2 s^2 Var(\xi_{1t}) + \beta^2\sigma^2(1+\rho)^2(1-s)^2 Var(\xi_{2t})$$
$$+2\beta^2\sigma^2(1+\rho)s(1-s)Cov(\xi_{1t}\xi_{2t})$$
$$Var(\Delta y_{1t}) \simeq Var(\xi_{1t}) + Var(\Delta v_{1t})$$
$$Var(\Delta y_{2t}) \simeq (1+\rho)^2 Var(v_{2t}) + \beta^2\rho^2 s^2 Var(\xi_{1t}) + \beta^2\sigma^2(1+\rho)^2 Var(\xi_{2t})$$
$$+2\beta^2\sigma(1+\rho)sCov(\xi_{1t}\xi_{2t})$$
$$Var(\Delta w_{1t}) \simeq Var(\xi_{2t}) + Var(\Delta v_{2t})$$

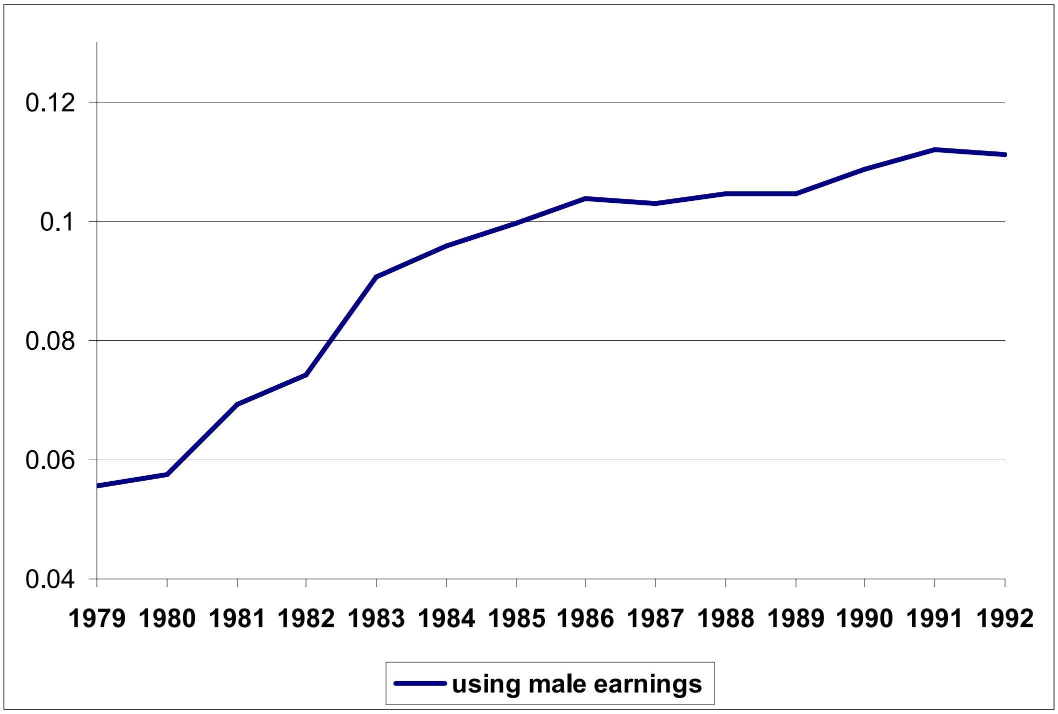
where $\beta = 1/(\sigma - \rho(1-s))$

s_t is the ratio of the mean value of the primary earner's earnings to that of the household

Table III Results: Taxes, Transfers and Family labor supply

Transmission Coefficients	Baseline	Couples earnings	Male earnings
Permanent Shock ϕ	0.6423 (0.0945)	0.4668 (0.0977)	0.2902 (0.0611)
Transitory Shock Ψ	0.0533 (0.0435)	0.0574 (0.0286)	0.0436 (0.0291)

Figure 6 Results: Variance of transitory shocks



Wealth and Durables

- Select (30%) initial low wealth.
- Impact of durable purchases as a smoothing mechanism?
- For poor households at least - absence of simple credit market
  - Excess sensitivity among low wealth households - even more impressive use of durables among low wealth households: - Browning, and Crossley (2003)

Table IV Results: Wealth and Durables

Transmission Coefficients	Low wealth sample	Low wealth sample, including durables
Permanent Shock ϕ	0.9589 (0.2196)	0.9300 (0.3131)
Transitory Shock Ψ	0.2800 (0.0696)	0.4259 (0.1153)

Summary – so far….

- The aim was to use panel data dynamics to uncover the 'insurance mechanisms' that shape the relationship between income and consumption inequality
- The standard incomplete markets model needs modifying to match the observed dynamics of income and consumption
- Find spike in the variance of permanent shocks in UK and US recessions.

Summary – so far….

- How well do families insure themselves against adverse shocks?
  - 30% of permanent shocks are insured on average
    - but not for low wealth families
  - found important role for tax and welfare
  - found important role for family labour supply and durable replacement
    - act as alternative and additional mechanisms for lower wealth groups
- Other countries – current circumstances?

Further Issues

- Is there evidence of anticipation?
- What if we use food consumption data alone?
- What if we ignore the distinction between permanent and transitory shocks?
- Alternative markets and models
  - stochastic simulation
  - detecting changes in factor loadings/persistence
  - advance information and less persistence

Anticipation

Test $\text{cov}(\Delta y_{t+1}, \Delta c_t) = 0$ for all t: p-value 0.3305
Test $\text{cov}(\Delta y_{t+2}, \Delta c_t) = 0$ for all t: p-value 0.6058
Test $\text{cov}(\Delta y_{t+3}, \Delta c_t) = 0$ for all t: p-value 0.8247
Test $\text{cov}(\Delta y_{t+4}, \Delta c_t) = 0$ for all t: p-value 0.7752

- We find little evidence of anticipation.
- This suggests the persistent labour income shocks that were experienced in the 1980s were not anticipated.
- These were largely changes in the returns to skills, shifts in government transfers and the shift of insurance from firms to workers.

Food Data in the PSID

- Food data alone?
  - This means there's no need to impute
  - The coefficients of partial insurance now are the product of two things: partial insurance of non-durable consumption and the budget elasticity of food
  - These coefficients fall over time

The Permanent-Transitory Distinction

- Suppose we ignore the durability distinction between permanent and transitory shocks
  - The transmission coefficient for labour income shocks is now a weighted average of the coefficients φ and ψ, with weights given by the importance of the variance of permanent (transitory) shocks
  - Thus, one will have the impression that 'insurance' is growing more rapidly.

Alternative Income Dynamics

General specification for labour income dynamics:

$$\ln Y_{i,a,t} = Z_{i,a,t}'\lambda + B_{i,a,t}' f_i + y^P_{i,a,t} + v_{i,a,t}$$

$$y^P_{i,a,t} = \rho y^P_{i,a-1,t-1} + \zeta_{i,a,t}$$

- but idiosyncratic trends suggest less persistence through y^P
- Lillard, Haider, Baker, Solon and Guvenen
- however, the change in the overall persistence is similar, information acquisition and the degree of persistence is subsumed in the 'partial insurance' parameter

Assessing Robustness of Approach

- Stochastic simulation of alternative economies
  - Create a simulation sample
- Alternative models (Kaplan and Violante, 2008)
  - Risk preferences
  - Advance information
  - Persistence
- Nonstationarity (Blundell, Low and Preston, 2007)
  - the permanent variance follows a two-state, first-order Markov process with the transition probability between alternative variances

The End

Appendix

Table A1: Results from the benchmark simulations

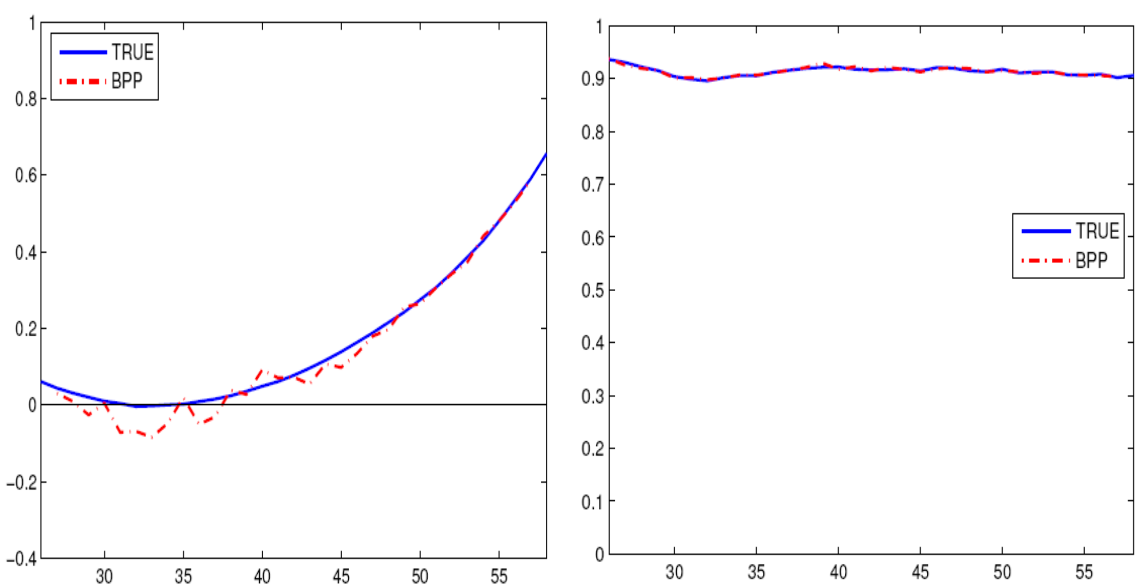
	Permanent Shock			Transitory Shock		
	Data BPP	Model BPP	Model TRUE	Data BPP	Model BPP	Model TRUE
Disposable Income	0.36 (0.095)	0.14	0.17	0.95 (0.044)	0.91	0.91
Pre-Govt Earnings:	0.69 (0.057)	0.26	0.27	0.94 (0.031)	0.94	0.94
Low Wealth	0.15 (0.285)	−0.22	0.00	0.72 (0.114)	0.89	0.89
High Wealth	0.38 (0.100)	0.15	0.22	0.99 (0.041)	0.92	0.92

Note: The parameters are 1 – transmission coefficients

Source: Kaplan and Violante (2008)

Figure A1: Age Profiles

persistent shock (left panel) and transitory shock (right panel)



Note: The parameters are 1 – transmission coefficients

Source: Kaplan and Violante (2008)

Table A2: Sensitivity Analysis

	Permanent Shock		Transitory Shock	
Data	0.36 (0.095)		0.95 (0.044)	
	Model TRUE	Model BPP	Model TRUE	Model BPP
Benchmark	0.17	0.14	0.91	0.91
Initial Wealth Distribution	0.17	0.15	0.91	0.91
Risk Aversion:				
$\gamma = 1$	0.15	0.12	0.91	0.91
$\gamma = 5$	0.24	0.20	0.91	0.91
$\gamma = 10$	0.33	0.27	0.90	0.90
$\gamma = 15$	0.39	0.32	0.89	0.89
Wealth Income Ratio:				
$\frac{K}{Y} = 1.5$	0.10	-0.01	0.79	0.78
$\frac{K}{Y} = 2.5$	0.14	0.08	0.87	0.87
Variance Permanent Shock:				
$\sigma_\eta = 0.03$	0.20	0.17	0.90	0.90
$\sigma_\eta = 0.01$	0.16	0.13	0.93	0.93
$\sigma_\eta = 0.005$	0.16	0.13	0.93	0.93
Variance Initial Permanent:				
$\sigma_{z_0} = 0.2$	0.18	0.15	0.91	0.91
$\sigma_{z_0} = 0.1$	0.17	0.14	0.92	0.92
Variance Transitory Shock				
$\sigma_\varepsilon = 0.075$	0.18	0.14	0.90	0.90
$\sigma_\varepsilon = 0.025$	0.17	0.15	0.92	0.92

Table A3a: Advance information I

One period ahead preempting of permanent shocks

	Permanent Shock			Transitory Shock	
Data	0.36 (0.095)			0.95 (0.044)	
	Model TRUE ϕ^η	Model TRUE (shock) ϕ^{η^s}	Model BPP ϕ^η_{BPP}	Model TRUE	Model BPP
Benchmark:					
$\alpha = 0.05$	0.21	0.17	0.17	0.91	0.93
$\alpha = 0.15$	0.29	0.17	0.15	0.91	0.96
$\alpha = 0.25$	0.37	0.17	0.16	0.91	0.99
No Borrowing:					
$\alpha = 0.05$	0.23	0.20	0.09	0.80	0.81
$\alpha = 0.15$	0.30	0.20	0.10	0.80	0.83
$\alpha = 0.25$					

Table A3b: Advance information II

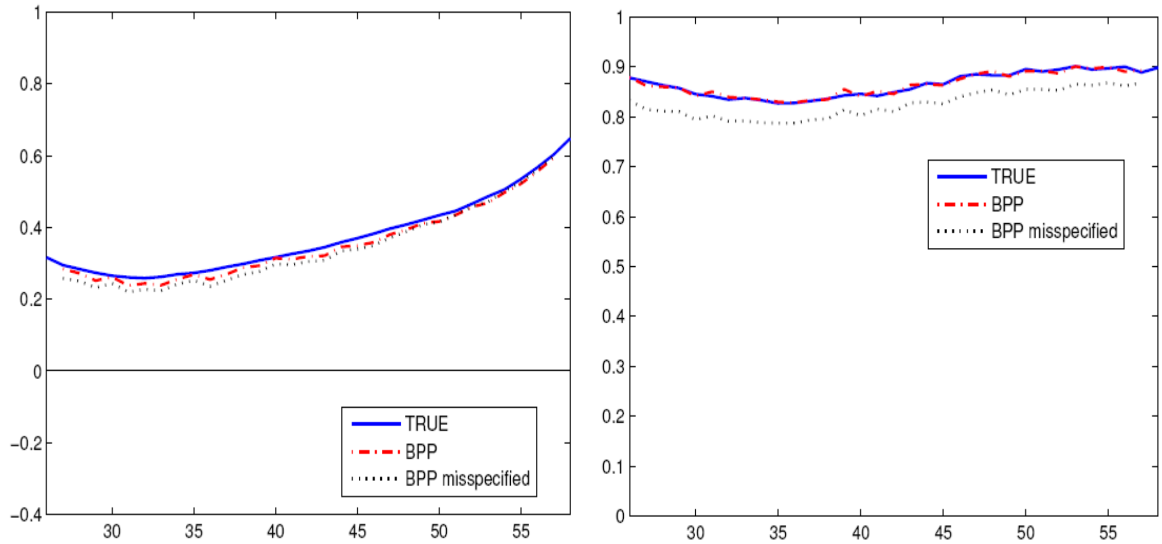
heterogeneous earnings slopes known at age zero

	Permanent Shock		Transitory Shock	
Data	0.36 (0.095)		0.95 (0.044)	
Fraction of $var(y_{i,60})$ known at $t=0$	Model TRUE	Model BPP	Model TRUE	Model BPP
Benchmark:				
20%	0.17	0.15	0.91	0.91
40%	0.17	0.16	0.91	0.91
60%	0.17	0.20	0.91	0.91
80%	0.17	0.29	0.92	0.92
No Borrowing:				
20%	0.19	0.07	0.79	0.79
40%	0.19	0.03	0.79	0.79
60%	0.19	−0.03	0.78	0.78
80%	0.19	−0.16	0.78	0.78

Table A4: Persistent Shocks

	Persistent Shock			Transitory Shock		
Data	0.36 (0.095)			0.95 (0.044)		
	Model TRUE	Model BPP	Model BPP misspecified	Model TRUE	Model BPP	Model BPP misspecified
Benchmark:						
$\rho = 0.99$	0.23	0.21	0.20	0.91	0.91	0.90
$\rho = 0.97$	0.31	0.29	0.28	0.88	0.88	0.86
$\rho = 0.95$	0.37	0.35	0.34	0.86	0.86	0.82
$\rho = 0.93$	0.42	0.40	0.39	0.85	0.85	0.79
$\rho = 0.91$	0.45	0.44	0.43	0.84	0.84	0.75
No Borrowing:						
$\rho = 0.99$	0.23	0.16	0.15	0.80	0.79	0.79
$\rho = 0.97$	0.29	0.25	0.24	0.79	0.79	0.77
$\rho = 0.95$	0.34	0.32	0.30	0.79	0.79	0.76
$\rho = 0.93$	0.38	0.37	0.35	0.79	0.79	0.74
$\rho = 0.91$	0.42	0.41	0.39	0.79	0.79	0.71

Figure A2: Age Profiles

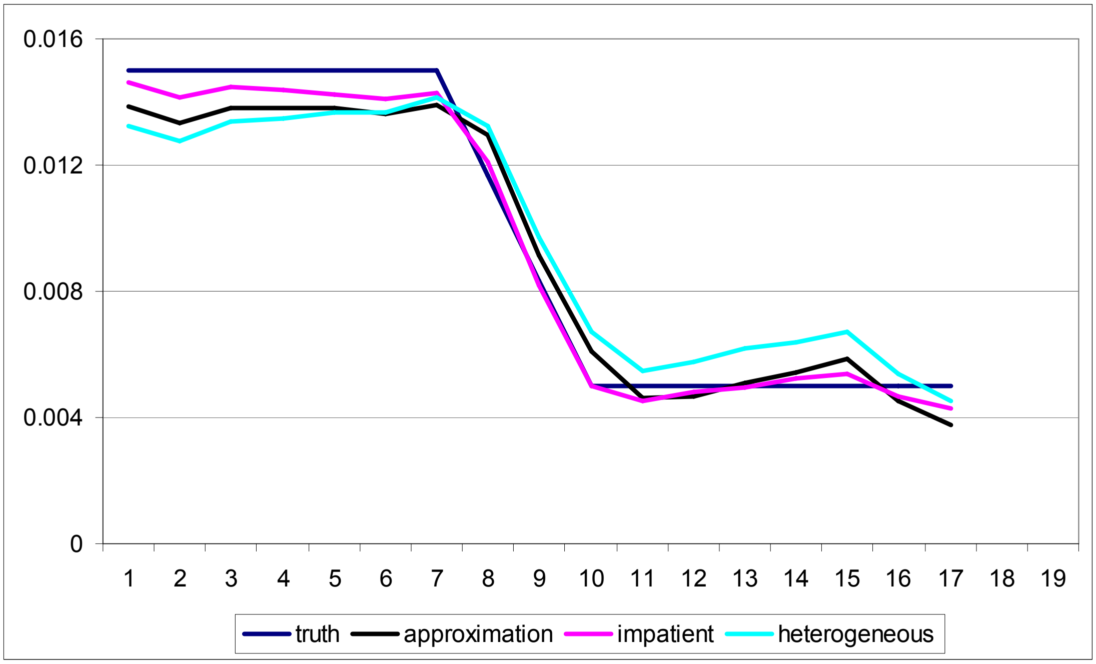


persistent shock (left panel) and transitory shock (right panel)

Detecting changes in variances

- In the base case the discount rate δ=0.02, also allow δ to take values 0.04 and 0.01. Also a mixed population with half at 0.02 and a quarter each at 0.04 and 0.01.
- In such cases the permanent variance follows a two-state, first-order Markov process with the transition probability between alternative variances.
- For each experiment, simulate consumption, earnings and asset paths for 50,000 individuals.
- Obtain estimates of the variance for each period from random cross sectional samples of 2000 individuals for each of 20 periods:

Figure A3: A Simulated Economy, permanent shock variance estimates



Source: Blundell, Low and Preston (2007)

Table A5: The Auto-Covariance Structure of Male Earnings

	Var (Δy_t)		Cov ($\Delta y_{t+1} \Delta y_t$)		Cov ($\Delta y_{t+2} \Delta y_t$)	
Year	**est.**	***s.e.***	**est.**	***s.e.***	**est.**	***s.e.***
1979	**0.1627**	***0.0291***	**-0.0648**	***0.0223***	**0.0032**	***0.0057***
1980	**0.1609**	***0.0244***	**-0.0428**	***0.0092***	**-0.0019**	***0.0088***
1981	**0.1524**	***0.0170***	**-0.0680**	***0.0121***	**-0.0035**	***0.0079***
1982	**0.2144**	***0.0223***	**-0.0687**	***0.0146***	**-0.0142**	***0.0093***
1983	**0.2557**	***0.0279***	**-0.0951**	***0.0184***	**0.0104**	***0.0123***
1984	**0.2785**	***0.0372***	**-0.0959**	***0.0179***	**-0.0084**	***0.0105***
1985	**0.2523**	***0.0272***	**-0.1046**	***0.0165***	**-0.0086**	***0.0125***
1986	**0.2850**	***0.0276***	**-0.0958**	***0.0156***	**-0.0279**	***0.0132***
1987	**0.2823**	***0.0338***	**-0.0823**	***0.0161***	**0.0030**	***0.0119***
1988	**0.2914**	***0.0396***	**-0.1246**	***0.0234***	**0.0126**	***0.0135***
1989	**0.2943**	***0.0438***	**-0.0953**	***0.0169***	**0.0094**	***0.0095***
1990	**0.2432**	***0.0264***	**-0.0849**	***0.0128***	**-0.0455**	***0.0173***

Source: Blundell, Pistaferri and Preston (2005)
Variance of log, PSID

Table A6: The Autocovariance Structure of Income - UK

Year	var(Δyt)	cov(Δyt,Δyt+1)	cov(Δyt,Δyt+2)	cov(Δyt,Δyt+3)
1992	0.0636	-0.0150	-0.0053	-0.0037
	(.0053)	(.0020)	(.0021)	(.0022)
1993	0.0529	-0.0135	-0.0033	-0.0011
	(.0028)	(.0021)	(.0017)	(.0015)
1994	0.0599	-0.0121	-0.0025	-0.0016
	(.0046)	(.0019)	(.0018)	(.0016)
1995	0.0653	-0.0120	-0.0005	0.0017
	(.0061)	(.0022)	(.0018)	(.0018)
1996	0.0511	-0.0125	0.0000	-0.0003
	(.0032)	(.0016)	(.0016)	(.0014)
1997	0.0493	-0.0101	-0.0015	0.0015
	(.0025)	(.0016)	(.0015)	(.0016)
1998	0.0515	-0.0111	-0.0002	0.0029
	(.0024)	(.0017)	(.0017)	(.0018)
1999	0.0484	-0.0107	-0.0014	-0.0004
	(.0028)	(.0020)	(.0016)	(.0016)
2000	0.0529	-0.0185	0.0005	0.0002
	(.0029)	(.0021)	(.0015)	(.0017)
2001	0.0555	-0.0139	-0.0013	0.0009
	(.0029)	(.0017)	(.0017)	(.0017)
2002	0.0511	-0.0137	0.0001	-
	(.0027)	(.0017)	(.0018)	-
2003	0.0506	-0.0147	-	-
	(.0034)	(.0018)	-	-
2004	0.0497	-	-	-
	(.0030)	-	-	-

Source: Blundell and Etheridge (2007)
Variance of log male wages, BHPS

Table A7: The Autocovariance Structure of Income - UK

Year	var(Δyt)	cov(Δyt,Δyt+1)	cov(Δyt,Δyt+2)	cov(Δyt,Δyt+3)
1992	0.1694	-0.0418	-0.0111	-0.0011
	(.0103)	(.0057)	(.0058)	(.0055)
1993	0.1334	-0.0311	0.0010	-0.0036
	(.0076)	(.0055)	(.0049)	(.0040)
1994	0.1688	-0.0436	0.0021	-0.0063
	(.0101)	(.0063)	(.0049)	(.0053)
1995	0.1504	-0.0321	0.0009	-0.0018
	(.0088)	(.0049)	(.0052)	(.0048)
1996	0.1180	-0.0350	-0.0089	0.0056
	(.0068)	(.0053)	(.0045)	(.0042)
1997	0.1514	-0.0408	-0.0039	-0.0025
	(.0089)	(.0059)	(.0047)	(.0039)
1998	0.1395	-0.0316	0.0046	0.0003
	(.0081)	(.0051)	(.0040)	(.0048)
1999	0.1362	-0.0384	-0.0053	0.0080
	(.0075)	(.0048)	(.0046)	(.0037)
2000	0.1211	-0.0286	-0.0092	0.0100
	(.0062)	(.0044)	(.0041)	(.0049)
2001	0.1302	-0.0339	-0.0131	-0.0033
	(.0071)	(.0049)	(.0050)	(.0051)
2002	0.1229	-0.0268	-0.0025	-
	(.0072)	(.0054)	(.0043)	-
2003	0.1327	-0.0325	-	-
	(.0080)	(.0054)	-	-
2004	0.1489	-	-	-
	(.0088)	-	-	-

Source: Blundell and Etheridge (2007)
Variance of log male earnings, BHPS

Table A8: Income and Consumption Inequality 1978-1992

UK			
Goodman and Oldfield (IFS, 2004)	**1978**	**1986**	**1992**
Income Gini	**.23**	**.29**	**.33**
Consumption Gini	**.20**	**.24**	**.26**
US			
Johnson and Smeeding (BLS, 2005)	**1981**	**1985**	**1990**
Income Gini	**.34**	**.39**	**.41**
Consumption Gini	**.25**	**.28**	**.29**

Both studies bring the figures up to 2001.

Relate to:

- **Atkinson (1997): UK income Gini rises 10 points late 70s to early 90s.**
- **Cutler and Katz (1992): US consumption Gini 65% of income inequality, 80-88.**
- **Gottschalk and Moffitt (1994): 1980s transitory shocks account for 50% growth**

Note: In comparison with the Gini, a small transfer between two individuals a fixed income distance apart lower in the distribution will have a higher effect on the variance of logs.