

# *Comparing Welfare Change Measures with Income Change Measures in Behavioural Policy Simulations*

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# *Motivation*

- Few studies using labour supply functions produce welfare measures
  - ◆ Policy analyses focus on income-based measures
  - ◆ Changes in leisure time are ignored
- Welfare measures account for the value of leisure and home production time
- The standard approach is not consistent with the theoretical framework of labour supply models



# *Difficulties*

- Individuals typically face highly nonlinear budget constraints due to complex tax and transfer systems
- Both net wage and labour supply are endogenous
- Probabilistic models generate a probability distribution over the hours alternatives (and not a single outcome)

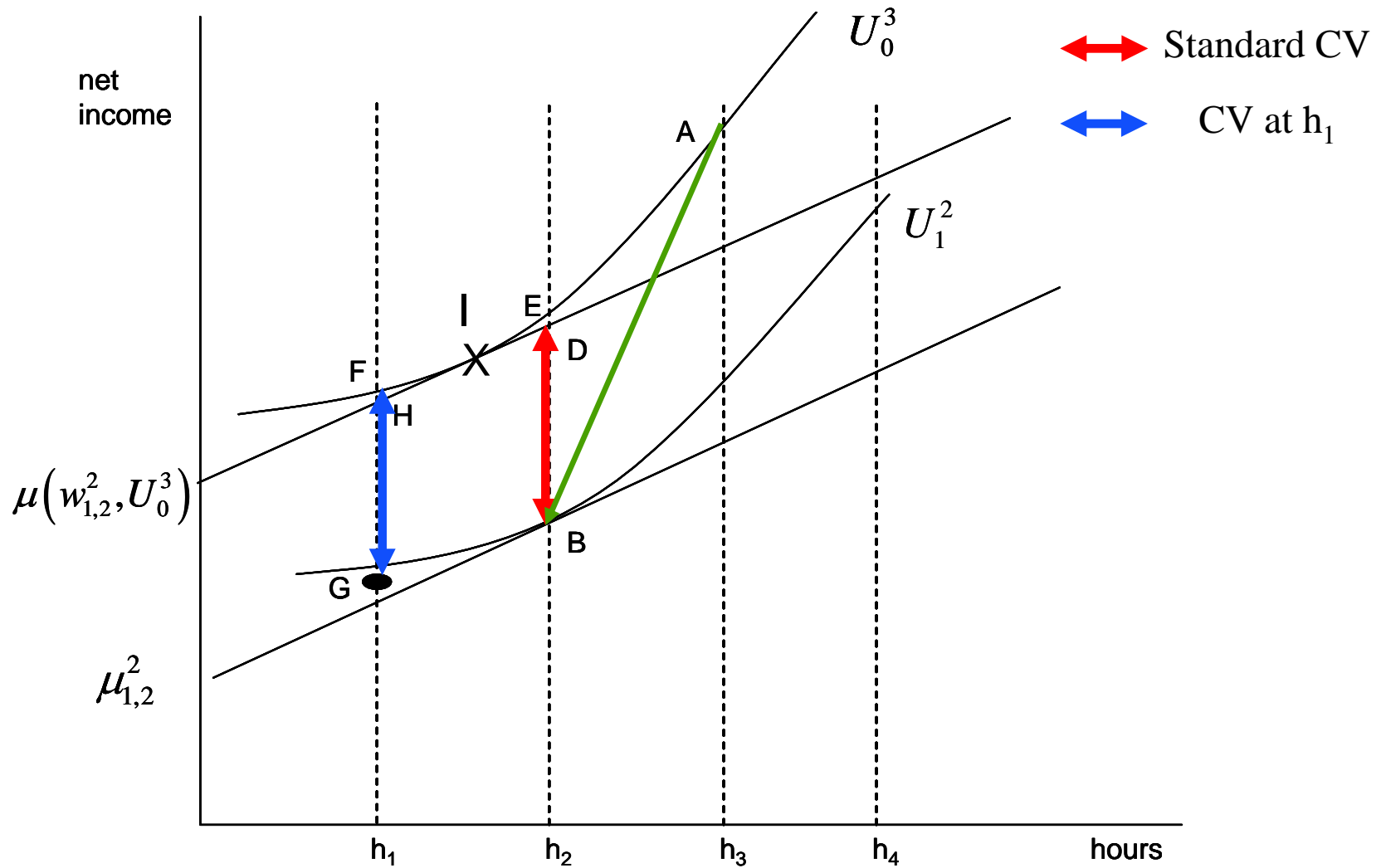


# *Basic concepts*

- **Compensating Variation (CV)** = the minimum amount of money necessary to return the individual to the same utility level as in system 0 after the change to system 1
- **Equivalent Variation (EV)** = the maximum amount that can be taken from an individual in order to keep utility constant at the new level
- **Convention:** positive value = welfare loss



# Discrete Choice Framework



# Social Evaluations

- Direct comparisons of welfare changes and net income changes can be made at the income unit level
- Social welfare functions useful to evaluate effects on specified demographic groups or for the population as a whole
- Implementation:

- ◆  $M_0$ : initial money metric utility (80 hours)
- ◆  $M_j$ : expected post-reform money metric utility
- ◆  $m_{ji}$ : money metric utility per adult equivalent ( $M_j/s$ )

☞ Social Welfare:

$$SW_j = \left( \frac{1}{n} \sum_{i=1}^n m_{ji}^{1-\epsilon} \right)^{1/(1-\epsilon)}$$

- where  $\epsilon$  is the degree of relative inequality aversion
- SW = the equally distributed equivalent money metric = the money metric which, if obtained by everyone, gives the same social welfare as the actual distribution

☞ Atkinson's inequality measure,  $A_j(\epsilon) = 1 - SW_j / \text{mean}(m_{ji})$



# The Approach Applied to Income Tax Increases (increase in all positive tax rates by 5 percentage points)

- Individual results (in \$ per year, except age and hours worked )

	Couple	Single man	Single woman	Single parent
Age	35, 35	45	45	25
Net income (pre-reform)	39,457	17,503	16,330	23,685
Net income (post-reform)	37,427	16,648	15,437	22,916
Change in net income	-2,031	-855	-893	-769
Net Government Revenue Change (Labour supply fixed)	1,850	703	630	244
Net Government Revenue Change (including labour response)	1,626	455	149	37
Hours worked per week	46, 6	40	27	13
Expected hours change in hours per week	-0.40, -0.10	-0.8	-1	-1.35
Compensating variation	1,839	690	615	232
Equivalent variation	1,843	691	626	233
Marginal Welfare Cost	0.1	0.5	3.2	5.4
Difference between Net Income change and <i>EV</i> (in %)	-9.3	-19.2	-29.9	-69.7



# *The Approach Applied to Income Tax Increases (increase in all positive tax rates by 5 percentage points)*

## ■ Aggregate results (in \$m per year)

	Couples	Single men	Single women	Single parents	TOTAL
<i>Increase in all positive income tax rates with 5 percentage points</i>					
Net Govt Revenue (Labour supply fixed)	9,699	2,307	1,338	325	13,669
Net Govt Revenue (including labour response)	8,013	1,977	1,100	-100	10,991
Average hours change in hours per week	-0.38, -0.42	-0.30	-0.26	-1.53	-0.41
Compensating variation	9,591	2,283	1,308	304	13,486
Equivalent variation	9,639	2,296	1,333	312	13,579
Marginal Welfare Cost	0.20	0.16	0.21	NA	0.24
Aggregate Net Income change	-11,417	-2,624	-1,540	-622	-16,203
Difference between Net Income change and EV (in %)	-15.6	-12.5	-13.4	-49.9	-16.2



# The Approach Applied to Income Tax Increases (increase in all positive tax rates by 5 percentage points)

## ■ Social Welfare Function Evaluations

	Mean	Social Welfare			Gini
		$\epsilon = 0.2$	$\epsilon = 0.8$	$\epsilon = 1.4$	
Pre-reform money metric	51,979	51,192	49,021	47,035	0.2080
Pre-reform net income	22,850	22,205	20,459	18,943	0.2913
<i>Increase in all positive income tax rates by 5 percentage points</i>					
Post-reform money metric	50,952	50,210	48,161	46,279	0.2039
% change	-1.98	-1.92	-1.76	-1.61	-1.97
Post-reform net income	21,617	21,060	19,552	18,243	0.2777
% change	-5.40	-5.16	-4.43	-3.70	-4.66

Note: Money metric and net income are per adult equivalent. Social Welfare is the equally distributed equivalent level of money metric (or net income)

**The equally distributed equivalent value is the value which, if obtained by everyone, gives the same social welfare as the actual distribution.**  
 $\epsilon$  is the degree of relative inequality aversion



# The Approach Applied to Income Tax Increases (increase in all positive tax rates by 5 percentage points)

## ■ Social Welfare Function Evaluations Disaggregated by Demographic Group

	Mean	Social Welfare			Gini
		$\varepsilon = 0.2$	$\varepsilon = 0.8$	$\varepsilon = 1.4$	
<b>Single women</b>					
Pre-reform money metric	40,229	39,788	38,512	37,277	0.1811
Post-reform money metric	39,587	39,175	37,984	36,824	0.1759
% change	-1.60	-1.54	-1.37	-1.21	-2.89
Pre-reform net income	18,082	17,586	16,185	14,921	0.2918
Post-reform net income	17,340	16,910	15,690	14,576	0.2771
% change	-4.10	-3.84	-3.06	-2.32	-5.03
<b>Single parents</b>					
Pre-reform money metric	36,477	35,866	34,186	32,733	0.2277
Post-reform money metric	36,146	35,555	33,929	32,521	0.2249
% change	-0.91	-0.87	-0.75	-0.65	-1.22
Pre-reform net income	17,135	16,916	16,314	15,790	0.1954
Post-reform net income	16,470	16,294	15,812	15,392	0.1765
% change	-3.88	-3.68	-3.07	-2.52	-9.70

Note: Money metric and net income are per adult equivalent. Social Welfare is the equally distributed equivalent level of money metric (or net income)

$\varepsilon$  is the degree of relative inequality aversion



# *Conclusions*

- The standard method of computing welfare changes may not give appropriate values where highly nonlinear budget constraints are common
- We propose a simpler method of calculating exact welfare changes, allowing for the full detail of the budget constraint as well as labour supply responses, in the context of discrete hours models
- Different conclusions may be reached depending on whether net income changes or welfare changes are used
- The advantage of using welfare changes in the evaluation of policy changes is that it takes into account the value of leisure or home production time



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