

# **Population ageing and future tax burdens**

**An integrated micro-macro analysis of possible taxation policy changes**

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# Background

- Norway will experience one of the sharpest increases in public expenses as a share of GDP in OECD if present welfare schemes are maintained.
  - The ratio of the number of individuals 67 years to the working force is expected to increase from 22 percent in 2002 to about 36 percent in 2050.
  - Over the same period the number of old-age pensioners is expected to increase by 78.7 percent.
  - The pay-as-you-go based pension system is still maturing.
  - Wage indexation of public pension benefits.

# Purpose of this study

- **Substantive:** How will aging affect the necessary tax burden in the next decades in Norway
  - accounting for incentive effects on labour supply from changes in taxes, wages and non-labour income
- **Methodology:** Integrating a detailed microeconomic model of labour supply into a large scale CGE model

# The microeconomic model

*allows large heterogeneity in labour supply behaviour*

- Simultaneous labour supply decisions of household members
- Both couples and singles
- Flexible representation of preferences (depending on age, number of children 0-2, 3-6, 7-14)
- Exact representation of complex budget sets induced by tax-transfer rules
- Constraints on hours-of-work opportunities

# Basic assumptions

$$U(C, h, j) = v(C, h) \varepsilon(h, w, j) \\ = v(f(wh, I), h) \varepsilon(h, w, j)$$

- $v(f(wh, I), h)$  is the systematic component
- $\varepsilon(h, w, j)$  is the stochastic component
- $\text{Prob}(\varepsilon < u) = \exp(-1/u)$

# Labour supply wage elasticities, Married couples, Norway 1994

Household income decile	Female		Male	
	Own	Cross	Own	Cross
I	2.54	-0.29	1.77	-0.12
II	0.97	-0.67	1.17	-0.08
III-VIII	0.41	-0.47	0.31	-0.24
IX	0.20	-0.34	0.08	-0.14
X	0.26	-0.10	0.05	-0.42
All	0.52	-0.42	0.39	-0.23

# The micro model: Aggregate labour supply Elasticities

across couples and singles, 20-62 years old

»Wage 0.12

»Income -0.17

# Observed and predicted *relative* distributions of disposable income in 2001

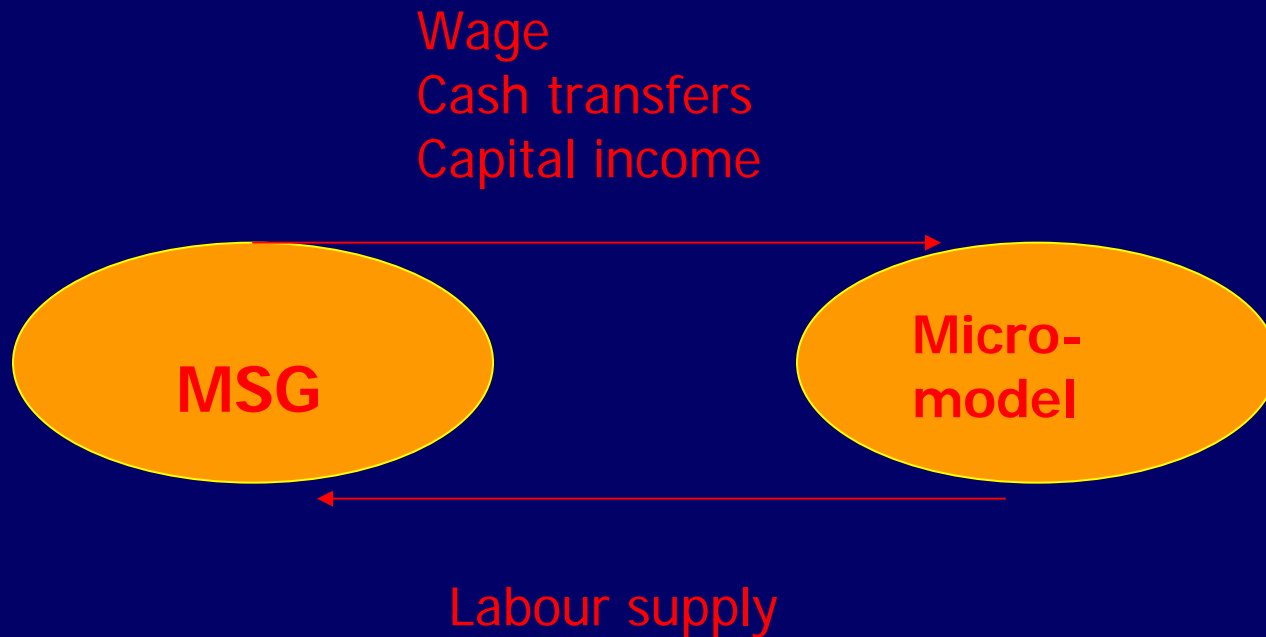
Deciles	Couples		Single males		Single females	
	Observed	Simulated	Observed	Simulated	Simulated	Simulated
<i>1</i>	<b>50</b>	<b>49</b>	<b>41</b>	<b>42</b>	<b>45</b>	<b>47</b>
<i>2</i>	<b>68</b>	<b>64</b>	<b>54</b>	<b>55</b>	<b>56</b>	<b>61</b>
<i>3</i>	<b>77</b>	<b>74</b>	<b>65</b>	<b>67</b>	<b>68</b>	<b>71</b>
<i>4</i>	<b>83</b>	<b>83</b>	<b>76</b>	<b>76</b>	<b>79</b>	<b>79</b>
<i>5</i>	<b>89</b>	<b>90</b>	<b>87</b>	<b>86</b>	<b>90</b>	<b>88</b>
<i>6</i>	<b>95</b>	<b>98</b>	<b>97</b>	<b>97</b>	<b>101</b>	<b>98</b>
<i>7</i>	<b>102</b>	<b>107</b>	<b>107</b>	<b>108</b>	<b>111</b>	<b>108</b>
<i>8</i>	<b>111</b>	<b>117</b>	<b>119</b>	<b>121</b>	<b>123</b>	<b>121</b>
<i>9</i>	<b>125</b>	<b>131</b>	<b>137</b>	<b>141</b>	<b>139</b>	<b>138</b>
<i>10</i>	<b>199</b>	<b>187</b>	<b>218</b>	<b>207</b>	<b>189</b>	<b>188</b>



# The CGE model MSG6

- Disaggregated:
  - 60 commodity groups,
  - detailed representation of taxes and government expenditure (endogenous)
- Dynamic
- General equilibrium:
  - Markets clear, full employment, rational behaviour)
  - Decreasing returns to scale in industries modifies somewhat the SOE determination of factor prices.
  - Growth determined by supply side conditions productivity, resources
  - Net foreign debt (wealth) does not explode
- Ignore mobility problems & bottle-necks.

# Integration of the Micro- and the CGE-model



# Simulations

		Tax system			
		Current (instrument: pay-roll tax rate)		Flat Tax (instrument: flat tax rate)	
		1995	2050	1995	2050
Labour Supply	Exog.				
	Endog.				

**Equilibrium in 2050. Change in % from 1995.**  
**Current Tax System. Endogenous pay-roll tax**  
**Endogenous vs Exogenous Labour Supply**

	<b>Exog. Lab. Supp.</b>	<b>Endog. Lab. Supp.</b>
<b>Private consumption</b>	<b>436,6</b>	<b>457,2</b>
<b>Government consumption</b>	<b>63,7</b>	<b>62,4</b>
<b>Real disposable national income</b>	<b>291,3</b>	<b>305,0</b>
<b>Consumer real wage rate</b>	<b>243,4</b>	<b>246,1</b>
<b>Employment, mill. man-hours</b>	<b>12,8</b>	<b>18,0</b>
<b>Pay-roll tax rate</b>	<b>97,9</b>	<b>61,6</b>

# Comments

- The necessary increase in the pay-roll tax rate reduced from 98 percent to 62 percent *when endogenous labour supply is accounted for.*
- Compared with earlier projections, our results imply that a larger part of the increased consumption by the elderly is financed by reduced leisure enjoyed by the working generations.
- Probably, an increase in tax revenue resulting from free choice is easier to implement politically than redistribution through higher tax rates.

# Reforming the Tax system...

- Labour supply is important
- Policies can help boosting labour supply
- A Flat Tax reform is a candidate

**Equilibrium in 2050. Change in % from 1995.  
 Flat Tax Reform in 1995. Endog. flat tax  
 Endogenous vs Exogenous Labour Supply**

	<b>Exog. lab. supply</b>	<b>Endog. lab. supply</b>
<b>Private consumption</b>	<b>436,6</b>	<b>513,4</b>
<b>Government consumption</b>	<b>63,7</b>	<b>58,9</b>
<b>Real disp national income</b>	<b>291,3</b>	<b>338,6</b>
<b>Consumer real wage rate</b>	<b>210,0</b>	<b>209,9</b>
<b>Employment, mill. man-hours</b>	<b>12,8</b>	<b>31,7</b>
<b>Flat Tax rate</b>	<b>33,3</b>	<b>-4,6</b>

# Comments

- The average flat tax rate - *ceteris paribus* - in 1995 is 24.0%
- Fiscal sustainability in 2050 would require to increase it to 32.0% if labour supply is kept exogenous
- If we take labour supply as endogenous, then fiscal sustainability would require only a 22.9% flat rate
- However, if we account for endogenous supply also in 1995, then the new equilibrium in 1995 would imply a 18.3% flat rate



# Summary of equilibrium tax rates

		Tax system			
		Current (instrument: pay-roll tax rate)		Flat Tax (instrument: flat tax rate)	
		1995	2050	1995	2050
Labour Supply	Exog.	<b>13.0</b>	<b>26.0</b>	<b>24.0</b>	<b>32.0</b>
	Endog.	<b>13.0</b>	<b>21.0</b>	<b>18.3</b>	<b>22.9</b>

# Conclusions

- Endogenous labour supply contributes to a much less worrying picture of future fiscal sustainability
- In particular, the problem appears to be reduced to manageable dimensions when the tax system is reformed in order to improve the incentives to labour supply
- Possible undesirable implications of FT
- Alternative policies to boost labour supply:
  - Pension reform
  - ...