Macroeconomic shocks – effects on employment and labour supply

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Labour supply in Norway was record-high in 2008 as a proportion of the population aged 16–74. As labour supply has grown, it has been responsive to changes in demand for labour. My analysis shows that labour supply is most elastic among those under 25 and those in their 50s. For the under-25s, this is because they can choose between employment and education; for the over-50s, there appears to be a choice between going on benefits and remaining in the labour force. In the 25–49 age group, around 80 per cent of the increase in employment is ascribable to a reduction in unemployment. Labour force participation in the 25–49 age group is somewhat more elastic among women than among men because of the choice between staying at home and going to work. The changes in employment are ascribable to a change in the full-time employment rate, while the part-time employment rate is unchanged.

Labour supply elasticity reflects people entering and exiting the labour force rather than registering as unemployed. When activity levels are high, more people enter the labour market. When activity levels fall, they find alternatives outside the labour force. At the same time, we know that participation in the labour market changes considerably during the course of life. The young make a choice between employment and education, while older people may have a choice between work and pension. Unemployment is generally higher among the young than among older people. In this article, I look at how employment and the labour supply in Norway change according to gender, age and alternatives outside the labour force when the economy is exposed to macroeconomic shocks, measured as changes in mainland GDP.

In an economic upswing, labour supply elasticity eases the pressure on wages. This may contribute to nominal stability. An increased education ratio during economic downturns provides a better starting point for the next upswing. On the other hand, more people on benefits or pensions may erode the economy's growth potential. A more elastic labour supply may also amplify business cycle fluctuations. Jaimovich and Siu (2008) argue that volatility in US GDP has fallen by 20–30 per cent since the early 1990s because young people's share of the labour force decreased during the period and so overall elasticity was reduced.

Relatively few studies to date have attempted to disaggregate how macroeconomic shocks affect the labour supply and employment in Norway. One exception is Solli and Svendsen (2001), who look at how changes in factors such as unemployment influence the labour force in different age groups once allowance is made for underlying structural trends. They find that real wages have a strong effect on the labour supply among young people and women aged 60–66.

In my analysis, I use time series for employment and the labour force broken down by gender and age, measured as a proportion of the population in the same age group. I use annual data for the period 1985–2008 and quarterly data from the first quarter of 1996 to the third quarter of 2008. The annual data are divided into five age groups and the quarterly data into 11. Both data series cover the population aged between 16 (15 from 2006) and 74. I also look at the population broken down into the following categories for principal activity other than employment: in education, at home, on benefits/early retirement, old-age pensioner and other[2]; and at the breakdown between full-time and part-time employment. I have used VAR analysis and impulse-response effects to see how these categories are affected by an unexpected rise (shock) in mainland GDP.

First, I present the data and choice of method. I then show how higher GDP growth affects employment and the labour supply according to gender and age, and discuss how the categories of people not in employment change following an equivalent shock. Finally, I look at the effects when employment is broken down into full-time and part-time.

[1] I would like to thank Kåre Hagelund, Ingvild Svendsen, Bent Vale and Fredrik Wulfsberg for useful comments and suggestions.

[2] "Other" includes unemployment and layoffs.

Data

The supply of labour in Norway in 2008 was 73.9 per cent[3], the highest level recorded since the Labour Force Survey (LFS) was first conducted in 1970. The increase reflected both underlying trend growth and cyclical effects. Chart 1 shows the deviation from trend growth in labour force participation for women and men together with Norges Bank's estimate of the output gap during the period 1983–2007. The series are closely correlated, as can be seen from the coefficients in the chart.

Labour force participation is highest among those aged 35–49 and lowest among the under-25s and over-55s (see Table 1). With the exception of the 15–19 age group, employment and labour force participation are higher among men than among women in all groups.

Among those who are outside the labour force, education is the dominant alternative among the under-25s, while benefits and pensions are the most important for the over-55s (see Table 2). "Benefits/early retirement" includes all those on permanent benefit schemes, including disability benefits, and those on a contractual early retirement pension (AFP) or voluntary pension scheme.[4] All of those in paid work, including part-timers, are counted as being in employment. The series are divided into five age groups but are not broken down by gender.

There was a major reform of the LFS in 2006, and the youngest age group was extended to include those aged 15.[5] (Charts and tables in this article that include data from before 2006 have 16 as the lowest age on the scale even though 15-year-olds are included as from 2006.)

Table 1 Employment and the labour force as a percentage of the population in each age group. Third quarter 2008. Seasonally adjusted

	15–19 years	20–24 years	25–29 years	30–34 years	35–39 years	40–44 years	45–49 years	50–54 years	55–59 years	60–64 years	65–74 years
Employment											
Women	43.7	69.7	82.5	85.4	84.9	87.2	85.2	82.0	74.9	53.4	12.7
Men	40.7	74.9	85.8	89.4	93.3	90.6	91.2	88.1	83.3	65.3	20.2
Labour force											
Women	48.5	73.3	85.0	87.0	86.5	87.7	85.7	82.8	75.7	53.9	12.7
Men	48.1	78.1	89.1	92.0	94.4	92.3	92.3	89.8	84.0	66.2	20.3

Sources: Statistics Norway and Norges Bank

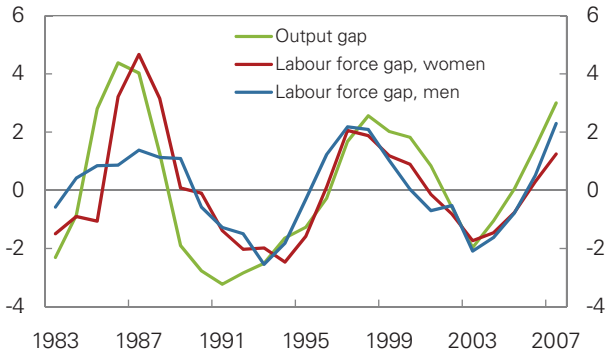
Table 2 Breakdown by category of principal activity. Percentage of the population in each age group. Third quarter 2008. Seasonally adjusted

	15–19 years	20–24 years	25–54 years	55–66 years	67–74 years
In employment	42.6	72.6	87.1	64.4	11.3
In education	53.6	20.6	2.1		
At home		1.3	1.5	2.2	
On benefits/early retirement		1.8	5.7	28.9	6.7
Old-age pension				2.2	80.9
Other	2.4	4.2	3.6	1.9	

Note: Because the series are seasonally adjusted independently of one another, the columns may not add up to 100.

Sources: Statistics Norway and Norges Bank

Chart 1 Deviation from trend growth in labour force participation for women and men and Norges Bank's output gap. Per cent. 1983 – 2007



Labour force measured as share of population in same age group.
Trend in labour force participation is calculated using a Hodrick-Prescott filter (λ=100).
Correlation:
Output gap – labour force gap, women: 0.74
Output gap – labour force gap, men : 0.76
Labour force gap, women – labour force gap, men: 0.93

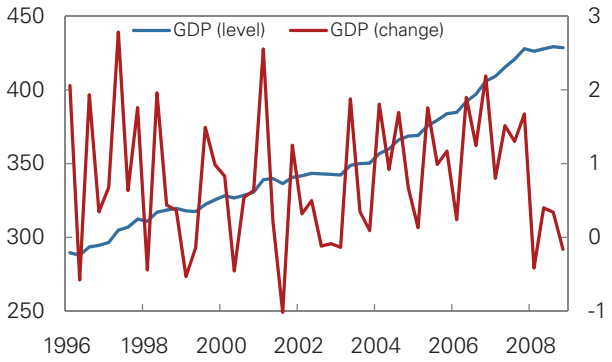
Sources: Statistics Norway and Norges Bank

[3] For the age group 15–74.

[4] AFP is a negotiated pension plan available to selected groups over the age of 62. However, an employee may retire on a pension before reaching the age of 62 where agreement has been reached with the employer.

[5] The definition of the age of respondents was also changed, from age at the end of the calendar year to age at the time the survey is conducted. This change is particularly significant in the timing of pensionable age. For 2006, figures were published for both the new and the old methods.

Chart 2 GDP mainland Norway, quarterly growth, seasonally adjusted. At constant 2006-prices. 1996 Q1 –2008 Q4 . Level (in billions of NOK, left-hand axis) and change (in per cent, right-hand axis)



Source: Statistics Norway

The figures available from the LFS show net flows into the labour market. Næsheim, Rønningen and Sletten (2008) looked at the gross flows behind the net figures published. They found that gross flows into and out of the labour force are far larger than the flows between employment and unemployment.

For volume growth in mainland GDP, I have used seasonally-adjusted quarterly data from the national accounts published in October 2008[6]. As can be seen from Chart 2, growth was high in 1996–1997 and 2004–2007. The average rate of quarterly GDP growth during the period 1996–2008 was 0.7 per cent, while the standard deviation was 0.8 per cent. Annual data for 1985–2008 result in an average growth rate of 2.9 per cent, with a standard deviation of 1.9 per cent.

Method

From a cyclical analysis viewpoint, it is interesting to understand how an unexpected change in demand, often referred to as a disturbance or shock, impacts on labour supply.

There are various ways of analysing how a shock in one variable impacts on the level of another. One is to use vector autoregressive (VAR) systems, where the effects of multiple variables are analysed simultaneously.

VAR is a method for capturing movements in and relationships between different variables without imposing a priori restrictions. In a VAR analysis, each variable in a system is estimated as a function of lagged values of itself and the other variables. An unexpected change is defined as one that is not explained by the model we are estimating.

In my analysis, I look at the effect of a change in mainland GDP on employment and labour supply broken down by age group and gender, and then at the effect on different categories of affiliation with the labour market. I estimate separate VAR systems for each age group. In my estimation of categories of principal activity other than employment, I do not have data broken down by gender. The variables are included in difference terms.

I evaluate the effects by looking at impulse-response functions. An impulse-response function shows how a variable reacts to an unexpected change in another variable, taking into account that other variables will also react to the initial shock.

I focus on cyclical effects. During the period analysed, the Norwegian labour force was also affected by structural factors that can be expected to impact on the results. The most important of these are demographic changes, an increase in female labour force participation and an increase in immigration.

In my analysis, I look at separate age groups, where each group can be assumed to be relatively homogeneous. Demographic effects should, therefore, have relatively little impact on the results.

Increased female labour force participation has been an underlying trend throughout the period analysed. The participation gap between men and women narrowed from 35.0 percentage points in 1972 to 10.6 in 1996 and 7.0 in 2007. In other words, the gap has been closing somewhat more slowly in recent years. This is in line with experience from other countries with high female participation rates, including the USA (see DiCecio et al. 2008).

I attempt to take account of this and other trends by including lagged variables in the estimations. Different tests of how many lagged variables should be included give different results. The likelihood ratio test indicates that two lags is the best specification for the quarterly series and that one is best for the annual data. This structure has been chosen for all of the estimations. There may, however, be a risk that this is not sufficient to capture all underlying trends. I find slightly greater uncertainty in the results for women than those for men.

Labour immigration into Norway has increased markedly since 2004, with the result that the population is growing. If immigrants have a different participation rate to the population as a whole, this may lead to spurious results. However, labour force participation statistics for immigrants from Poland and the Baltic States are broadly in line with the general population.[7] Immigration will impact on overall labour force participation because the

[6] In my analysis of annual data, I have used the national accounts figures published in February 2009.

[7] See http://www.ssb.no/english/subjects/06/01/innvregsys_en/. In the fourth quarter of 2007, the employment rate was 70 per cent for the general population and 70.7 per cent for citizens from the new EU countries.

age composition of immigrant groups differs from the average for the general population, but this will have only a limited effect on my analysis.

Effects on employment and labour supply

Table 3 presents the effects on employment and labour supply of a permanent increase in mainland GDP of around 2 per cent. The greatest effect is from year 1 to year 2. It then subsides and peters out after year 4. The table shows the cumulative effect after years 2 and 4.

The effects are clearly strongest for young people. This is in line with the hypothesis that the choice between education and employment is the most important factor explaining labour force elasticity in this group. The effect decreases through to the 40–54 age group before rising again somewhat for men in the over-55 age group. This may indicate that men in this group make a choice between remaining in the workforce and going onto benefits or a pension. The analysis finds no such effect for women.

The difference between the effect on labour supply and the effect on employment gives us the effect on unemployment. Table 4 shows that the increase in GDP leads to reduced unemployment in all age groups. Unemployment falls furthest among men and among those in their twenties and thirties. Among women, a larger proportion of the increase in employment is recruited from outside the labour force, with the result that unemployment is reduced to a lesser extent.

Charts 3–7 present the results of estimations based on quarterly data for an increase in GDP of 0.8 per cent in the first quarter.

Chart 3 shows the cumulative effect of increased GDP on employment and the labour force for men in 11 age groups between 16 and 74 after one and eight quarters.[8]

Table 4 Effect of an increase in mainland GDP on unemployment after two and four years. Percentage point change in the proportion of each age group

	Men		Women	
	Year 2	Year 4	Year 2	Year 4
16–19 years	–0.8	–0.7	–0.4	–0.3
20–24 years	–1.2	–1.7	–0.8	–1.2
25–39 years	–0.8	–1.1	–0.4	–0.6
40–54 years	–0.5	–0.8	–0.3	–0.6
55–74 years	–0.2	–0.3	–0.1	–0.3

Note: Effect calculated on the basis of the figures presented in Table 3. The effect on unemployment emerges as the cumulative effect on labour supply less the cumulative effect on employment.

Table 3 Cumulative effect of an increase in mainland GDP on employment and the labour force after two and four years. Percentage point change in the proportion of each age group

Year 2	Employment				Labour force			
	Men	St. error	Women	St. error	Men	St. error	Women	St. error
16–19 years	2.2*	0.7	1.6*	0.8	1.4	0.8	1.2	0.8
20–24 years	1.9*	0.5	1.2*	0.5	0.7	0.4	0.4	0.5
25–39 years	1.3*	0.3	0.9*	0.2	0.5*	0.2	0.5*	0.2
40–54 years	0.8*	0.2	0.6*	0.2	0.3*	0.1	0.3	0.2
55–74 years	0.7	0.4	0.1	0.3	0.5	0.4	0.0	0.3

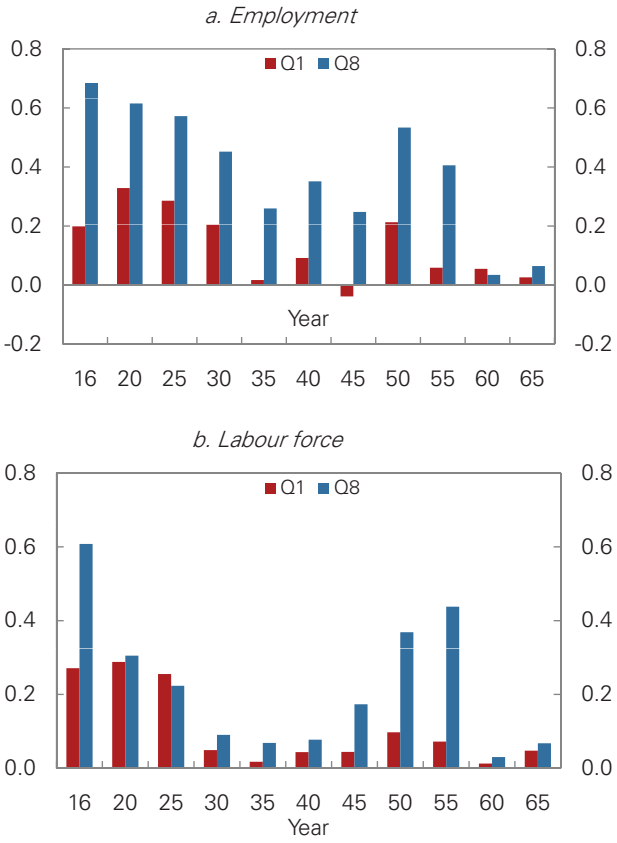
Year 4	Employment				Labour force			
	Men	St. error	Women	St. error	Men	St. error	Women	St. error
16–19 years	4.2*	1.4	3.7*	1.4	3.5*	1.2	3.5*	1.2
20–24 years	3.3*	1.4	2.5*	0.8	1.6*	0.7	1.2	0.7
25–39 years	1.9*	0.7	1.4*	0.5	0.8*	0.3	0.8*	0.3
40–54 years	1.3*	0.5	1.3*	0.5	0.5*	0.2	0.7	0.4
55–74 years	1.5	1.0	0.9	0.6	1.2	0.8	0.6	0.5

Note: The impulse-response effect for each age group has been estimated separately and shows the effect of a permanent change in GDP of one standard deviation in the first period. This corresponds to annual growth of around 2 per cent. The effects on employment and the labour force are measured as the percentage point change in the proportion of the population in each age group. Estimated on the basis of annual data from 1985 to 2008. The shock in mainland GDP is based on the volume change from the annual national accounts, while unemployment and employment are taken from the LFS.

* indicates that the size of the coefficient is at least two standard errors.

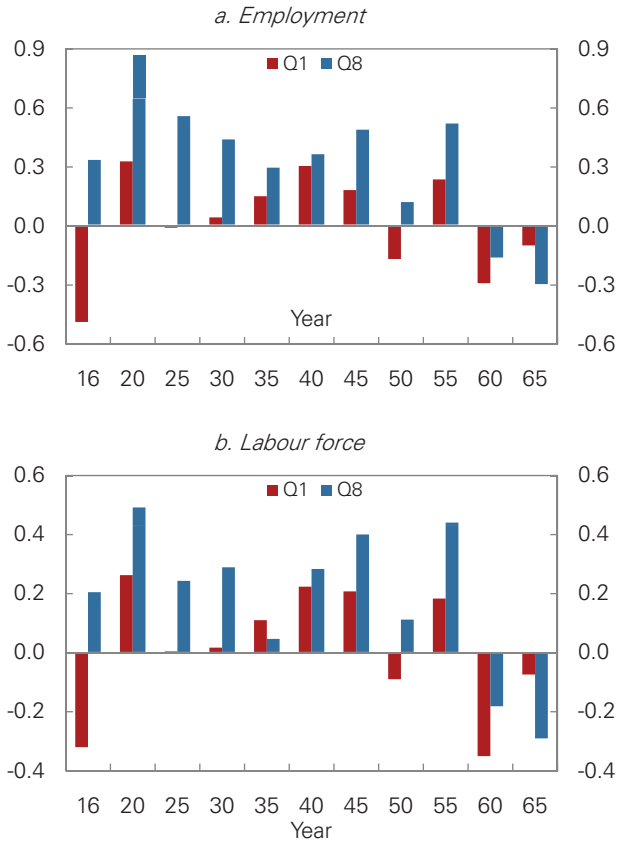
[8] All of the results presented in Charts 3–7 are based on Tables 8 and 9 (see Appendix), which also show the standard error for the various coefficients.

Chart 3 Accumulated effects after 1 and 8 quarters for employment and labour force for men in 11 age groups between 16 and 74 years given an increase in mainland GDP. Percentage point change for each age group.



Impulse responses for each age group are estimated separately. The change in GDP is standardised to one standard deviation in the first quarter. This corresponds to seasonally adjusted growth of 0.8 per cent. The effects on employment and the labour force are measured as the percentage point change in the proportion of the population in each age group. Estimated on quarterly data from 1996 Q1 to 2008 Q8 . Changes in mainland GDP are collected from the national accounts, while employment and labour force figures are from the LFS. Numbers and standard errors are given in Tables 8 and 9.

Chart 4 Accumulated effects after 1 and 8 quarters for employment and labour force for women in 11 age groups between 16 and 74 years given an increase in mainland GDP. Percentage point change for each age group.



See footnote, Chart 3.

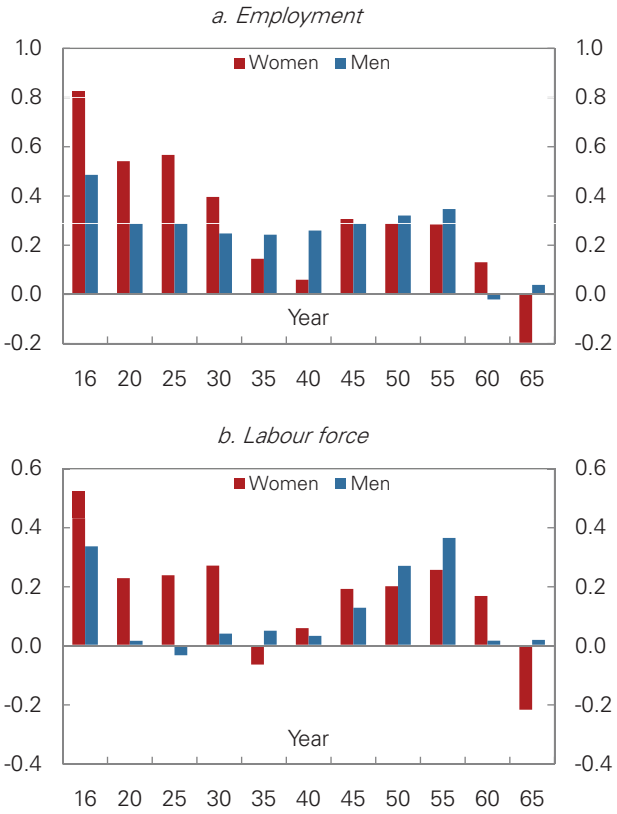
The groups showing the greatest change in the first period also show the greatest change after eight quarters.

As with the results based on annual data, I find that labour supply elasticity is greatest among men under 25 and men in their fifties. Labour force participation in the age groups between 35 and 49 hardly changes at all, which indicates that most people in these age groups who want to work are already part of the labour force. Among men over the age of 60, there is little effect on either employment or the labour force. The age pattern is more pronounced when looking at labour supply than when looking at employment.

Chart 4 presents the equivalent results for women. As we saw in Table 1, the youngest women have much the same participation rate as men in the same age group, but there are greater differences between the sexes in the age groups between 25 and 39. Women have a greater tendency to stay at home after having children. This means that more women are outside the labour force. The flipside of this is that more women are able to join the labour force if demand for labour changes. In my results, this is reflected by labour supply elasticity being less affected by age among women than among men.

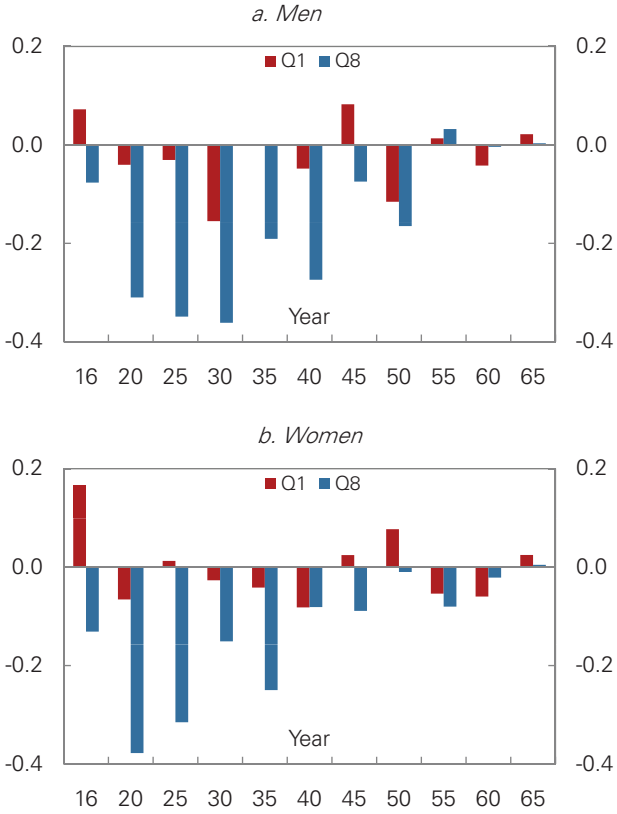
I find a somewhat counterintuitive *negative* effect on both employment and labour supply in the first quarter for women in the 16–19 and 50–54 age groups. This may be due to noise in the data series due to short-term effects. To take account of this, Chart 5 shows the cumulative effects on employment and labour supply in the eighth quarter net of the effect after the first quarter. The reported difference between the results for men and women is now smaller. For both employment and the labour force, the effect is greater among the under-25s and those aged 45–59 than in the other groups. This supports the impression of positive elasticity in the 50–59 age group.

Chart 5 Change in accumulated effect on employment and labour force from Q1 to Q8 given an increase in mainland GDP. Men and women between 16 and 74 years. Percentage point change in the share of the population in the same age group.



Effects are calculated based on figures in Tables 8 and 9. Charts show the accumulated effect after Q8 minus the accumulated effect after Q1.

Chart 6 Accumulated effect on unemployment for men and women between 16 and 74 years given an increase in mainland GDP. Effects after Q1 and Q8. Percentage point change in the share of the population in the same age group.

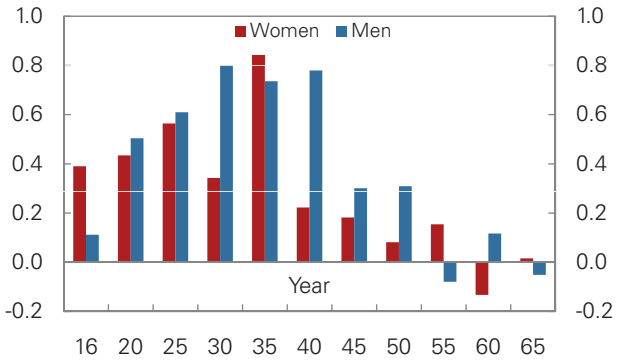


Effects are calculated based on figures in Tables 8 and 9. Effect on unemployment is calculated as accumulated effect on the labour force minus the accumulated effect on employment.

Chart 6 shows the effect on unemployment among men and women. In the short term, an increase in GDP has only a minor effect on unemployment. This means that increased demand for labour attracts roughly the same number of new jobseekers as there are new jobs. After eight quarters, however, there is a marked effect on unemployment, especially in the age groups between 20 and 44. This ties in with the results in Table 4. For these groups, the decrease in unemployment is approximately one-third of the increase in GDP, which is in line with the ratio in Okun's Law[9]. Among older people, the increase in GDP has little or no impact on unemployment.

Chart 7 summarises the results by showing the proportion of the increase in employment due to reduced unemployment in each age group, broken down by gender. For men aged 30–44, around 80 per cent of the increase in employment comes from a decrease in unemployment. For the other groups, less new labour is sourced from the dole queue. Overall, almost 60 per cent of the rise in employment comes from reduced unemployment.

Chart 7 Relative share of increase in employment resulting from a reduction in unemployment. Men and women between 16 and 74 years.



Effects are calculated based on figures in Tables 8 and 9. Chart shows the accumulated effect on unemployment as a share of the accumulated effect on employment in Q8.

[9] Okun's Law (Arthur Okun, 1970) states that if actual output rises by 3 per cent relative to potential output, unemployment will fall by 1 per cent. A decrease in output will result in a corresponding increase in unemployment. Okun's Law was based on observations of US data for the 1950s and 1960s.

Table 5 Estimations of the effect on the labour force after eight quarters using various constructed series for GDP growth. Men aged 50–54 and 55–59. Percentage point change

	All		>average		<average	
	Effect	St. error	Effect	St. error	Effect	St. error
50–54	0.37*	0.11	0.28*	0.11	0.35*	0.14
55–59	0.44*	0.20	0.39*	0.18	0.27	0.21

	All		>zero		<zero	
	Effect	St. error	Effect	St. error	Effect	St. error
50–54	0.37*	0.11	0.32*	0.13	0.21	0.12
55–59	0.44*	0.20	0.43*	0.20	0.03	0.17

Note: The impulse-response effect for each age group has been estimated separately.

- "All" shows the effect when I use the original series with changes in mainland GDP.
- In ">average", I have constructed a series with changes in GDP set equal to the average change during the period 1996–2008 but equal to the actual change if this is greater than the average change.
- In "<average", I have constructed a series with changes in GDP set equal to the average change during the period 1996–2008 but equal to the actual change if this is less than the average change.
- In ">zero", I have constructed a series with changes in GDP set equal to zero in all periods but equal to the actual change if this is greater than zero.
- In "<zero", I have constructed a series with changes in GDP set equal to zero in all periods but equal to the actual change if this is less than zero.

* indicates that the size of the coefficient is at least two standard errors.

Asymmetrical effects?

If those who leave the labour force cannot be recruited back into it, changes in unemployment may have long-term consequences. Røed (2008) and Lien (2007) find that the number of people on disability benefits increases during economic downturns. Salvanes, Møen and Huttunen (2008) find that 12.3 per cent of those who lose their jobs during a restructuring are outside the labour force after five years. If it is the case that those in their fifties go onto benefits when demand for labour falls and do not return when demand recovers, my results will overestimate elasticity in this age group.

My empirical method does not distinguish between positive and negative demand shocks. To test for asymmetrical effects, I have estimated an additional four systems for the 50–54 and 55–59 age groups. Here I have replaced the series for changes in GDP with two series where the GDP change is set equal to the actual change when it is greater than/less than the average change (and otherwise equal to the average) and two series where the GDP change is set equal to the actual change when it is respectively greater than/less than zero (and otherwise equal to zero).

The two GDP series representing growth above and below the average have a different average growth rate but roughly the same standard deviation. If the effects I have reported above are symmetrical, I would expect to find more or less the same impact on employment and labour supply with each of these series. The series where I distinguish between positive and negative growth rates have different standard deviations, as there are only a few observations with negative GDP growth. Strong effects for the series with negative GDP growth would indicate that it is these results that drive the results in the original analysis.

Table 5 reports the results together with the corresponding effects when I use the original GDP growth series. As can be seen, the assumption of symmetry holds when I split the GDP series around the average. There are only small differences between the results of the estimations for the two series. When I split between positive and negative GDP growth, I find a greater effect from positive shocks than from negative ones.[10]

These results can be taken as an indication that labour supply among men in their fifties reacts symmetrically to ups and downs in the economy. This can be interpreted as hysteresis[11] being a limited problem with people going onto benefits. One must be cautious about such an interpretation. At the very least, one must distinguish between hysteresis at individual level and hysteresis at group level. Hysteresis at individual level means that a person who has gone onto benefits will stay on benefits. My data are not well-suited to testing such an assumption. Hysteresis

[10] In addition, I have estimated a VAR using the original series but with a dummy for the economic downturn from 2001 to 2003. This does not have any significant impact on the results either.

[11] Hysteresis: The tendency not to return to an original state after being changed by an external force which then ceases.

Table 6 Cumulative effect of an increase in mainland GDP on different age groups and categories of principal activity. Percentage point change in the proportion of the population in each age group

	16–19	*St. error*	20–24	*St. error*	25–54	*St. error*	55–66	*St. error*	67–74	*St. error*
Q1										
In employment	0.11	*0.17*	0.09	*0.16*	0.07	*0.04*	0.02	*0.11*	0.06	*0.12*
Other	0.07	*0.06*	0.10	*0.10*	0.03	*0.03*	0.02	*0.04*		
In education	–0.16	*0.17*	–0.19	*0.14*	–0.04*	*0.02*				
At home			–0.04	*0.04*	–0.02*	*0.01*	0.07	*0.05*		
On benefits/early retirement					–0.05*	*0.02*	–0.21	*0.12*	0.07	*0.13*
Old-age pension							0.12*	*0.04*	–0.03	*0.18*
Q8										
In employment	0.53	*0.35*	0.84*	*0.42*	0.39*	*0.19*	0.01	*0.16*	–0.13	*0.18*
Other	0.03	*0.08*	–0.36	*0.19*	–0.20	*0.16*	–0.04	*0.05*		
In education	–0.61	*0.34*	–0.44	*0.29*	–0.04	*0.04*				
At home			–0.02	*0.07*	–0.05*	*0.02*	–0.02	*0.06*		
On benefits/early retirement					–0.10	*0.06*	–0.07	*0.15*	–0.05	*0.23*
Old-age pension							0.12*	*0.06*	0.34	*0.31*

Note: The change in GDP is one standard deviation in the first period. This corresponds to seasonally-adjusted quarterly growth of 0.8 per cent. The effects on employment and other categories of principal activity are measured as the percentage point change in the proportion of the population in each age group. The table presents the cumulative effects after one and eight quarters. Estimated on the basis of quarterly data for the period from the first quarter of 1996 to the third quarter of 2008. Mainland GDP is the seasonally-adjusted volume change from the quarterly national accounts, while the other data are taken from the LFS.

* indicates that the size of the coefficient is at least two standard errors.

at group level means that, if the proportion of people on benefits in an age group rises, this proportion will remain high over time, even though each year one cohort will leave that age group and another will join. My results suggest that the proportion of people in their fifties going onto benefits may be affected by the business cycle and not just be a function of how many are already on benefits in older cohorts. I must add that the underlying trend points towards a rise in the proportion of people on benefits in these age groups. An economic upswing will merely put a damper on this trend.

Effects on categories outside the labour force

Those who are in full-time education, stay at home or are on benefits are outside the labour force. As we saw above, changes in the labour force explain 40–50 per cent of the rise in employment following an increase in GDP. Table 6 summarises the results for how a shock in mainland GDP affects the proportions of people in the various categories outside the labour force.[12]

In the 16–19 age group, the whole of the positive effect on the labour force comes from a reduction in the number of people in full-time education, while in the 20–24 age group the effect comes from both students and homemakers. For both age groups, there is an increase in the "other" category in the first quarter, while the cumulative effect is negative when looking several quarters ahead. In the first periods after the shock, more people will actively seek work, while employment increases over time because more unemployed people find jobs.

In the 25–54 age group, the effect on the labour force is smaller, because more than half of the growth in employment after eight quarters comes from a reduction in the number of unemployed. This is in line with the results presented in Charts 6 and 7. The increase in the labour force is divided relatively equally between fewer people in education, fewer people staying at home and fewer people on benefits.

According to the LFS (base tables, third quarter 2008), 94 per cent of those who stayed at home in the third quarter of 2008 were women. The effect from homemakers may explain why women in their forties show slightly greater elasticity than men (see Charts 3 and 4).

Chart 3 revealed big differences in elasticity before and after the age of 50. The effect on those going onto benefits probably comes mainly from the over-50s. Røed (2007) asks whether Norway could not use economic upswings to reduce the proportion of the population on benefits. The results in Table 6 indicate that the proportion of people on benefits is sensitive to fluctuations in demand

[12] Note that, in this section, the labour force is defined as those in employment plus "other", where "other" includes both the unemployed and those who do not claim to belong to any of the categories of principal activity in the LFS.

as measured by GDP. The flipside is that this effect is countered by a rise in the number of people on benefits when GDP falls.

Another result above was that there was a big difference when I compared the 55–59 and 60–64 age groups. As can be seen from Table 6, I find almost no effect for the 55–66 age group viewed as a whole. The only change is an increase in the number of old-age pensioners.

I also find that a rise in GDP *increases* the number of old-age pensioners in the 67–74 age group. There is reason to believe that there are opposing forces at play here. On the one hand, increased demand makes it possible to stay in work for longer. On the other, there may be expulsion effects during a boom period. Higher profits make it easier to pay severance packages to older employees. It may also be the case that an increase in new recruits makes it less attractive to stay in the workplace. In addition, it may seem less risky to retire during an economic upswing, as there is the possibility of returning to work should this be necessary.

Effects on full-time and part-time employment

According to the LFS, 18.7 per cent of the Norwegian population worked part-time in the third quarter of 2008. Of these people, 73.6 per cent were women. One might imagine that part-time positions are more sensitive to changes in demand than full-time positions. Buddelmeyer et al. (2008) find that part-time employment falls during upswings in the EU-15 countries. They argue that employers use part-time employment as a means of adjusting hours worked to economic activity. They find that part-time employment is also affected by structural factors such as public regulation.

When I divide employment into full-time and part-time, I find that the whole of the employment effect comes from changes in the number of full-time employees (see Table 7). Further calculations produce the same result for both genders. Nor is the result affected if I divide part-time employment into "short" (up to 19 hours) and "long" (20–37 hours), or break the data down by age. The exception is the over-55 age group, where there is a slight positive effect on part-time employment when GDP rises.

One possible explanation is that part-time employment in Norway is concentrated around women in the public sector and therefore exhibits limited cyclical sensitivity. Another possibility is that we are observing the sum of two opposing effects. During an upswing, it is natural to recruit people from part-time positions into full-time employment. At the same time, new people will be recruited into the labour force through part-time positions. The net effect on part-time employment of an increase in demand for labour will then be limited.

Table 7 Cumulative effect of an increase in mainland GDP on full-time and part-time employment. Percentage point change

	Full-time	*St. error*	Part-time	*St. error*
Q1	0.04	*0.04*	0.01	*0.04*
Q8	0.41*	*0.18*	0.01	*0.07*

Note: The change in GDP is one standard deviation in the first period. This corresponds to seasonally-adjusted quarterly growth of 0.8 per cent. The effects on employment are measured as the change in the proportion of the working-age population. The table presents the cumulative effects after one and eight periods. Estimated on the basis of quarterly data for the period from the first quarter of 1996 to the third quarter of 2008. Mainland GDP is the seasonally-adjusted volume change from the quarterly national accounts, while the data for full-time and part-time employment are based on LFS figures.

* indicates that the size of the coefficient is at least two standard errors.

Summary

The labour supply in Norway has shown an ability to respond to changes in economic activity. My analysis has shown that elasticity is highest among those under 25 and those in their 50s. For young people, it is mainly the choice between education and employment that is sensitive to fluctuations in demand for labour. Among the over-50s, I find signs of a choice between employment and benefit schemes outside the labour force. In addition, cyclical changes have an effect on labour force participation among women via elasticity among homemakers in their 40s. With the opposite effect, increased demand for labour seems to accelerate retirement into old-age pension. The whole of the net effect on employment comes from a change in full-time employment; I find no effect on part-time employment.

This analysis reflects the somewhat two-sided picture of the Norwegian labour market painted by Røed (2007) among others. On the one hand, labour force participation is high by international standards, especially because of the particularly high participation rate among women. Furthermore, young Norwegians have a low threshold for switching between employment and education, and so economic fluctuations do not lock groups into unemployment at a young age. On the other hand, older workers make a choice between employment and benefit schemes outside the labour force. Instead of registering as unemployed, they may opt for benefits. Norway is one of the countries in Europe with the highest proportions of the working-age population on permanent benefit schemes.

There is normally reason to believe that it is difficult to recruit people who are on benefits back into the labour force. This means that economic downturns may reduce the labour force on a permanent basis. At the same time, unemployment is kept artificially low by people in prac-

tice switching to these alternatives outside the labour force. My results show that this is not unambiguously the case. It is indeed possible that people who are on benefits stay on benefits. But the proportion moving into benefits in each period is sensitive to economic activity. During an upswing, the proportion will fall; during a downturn, it will rise.

Another kind of "duality" can be seen in the differences between men and women. When I look at labour force participation for all of the age groups together, men and women appear to behave almost identically in the labour market. However, once I disaggregate by age, I find that there are still signs of gender-related differences.

Given that so many Norwegian women work part-time, I had expected their labour supply elasticity to be reflected in a reaction of the part-time employment rate to changes in aggregate demand. This was not confirmed by the data. Part-time employment does not seem to be a buffer for fluctuations in aggregate demand – the adjustment occurs in the full-time employment rate.

On balance, my analysis confirms that there are big differences in elasticity according to both gender and age. This underlines the value of using disaggregated data when analysing the labour market.

Appendix

Tables 8 and 9 present the results behind Charts 3–7. They also show the standard error for the various coefficients.

Table 8 GDP shocks – effect on employment. Percentage point change

		Women		Men	
	Time from shock	Effect	*St. error*	Effect	*St. error*
Total	Q1	0.03	*0.04*	0.06	*0.04*
16–19 years	Q1	–0.49	*0.33*	0.20	*0.41*
20–24 years	Q1	0.33	*0.24*	0.33*	*0.19*
25–29 years	Q1	–0.01	*0.16*	0.29	*0.15*
30–34 years	Q1	0.04	*0.13*	0.20	*0.14*
35–39 years	Q1	0.15	*0.10*	0.02	*0.11*
40–44 years	Q1	0.31*	*0.11*	0.09	*0.09*
45–49 years	Q1	0.18	*0.11*	–0.04	*0.09*
50–54 years	Q1	–0.17	*0.12*	0.21	*0.11*
55–59 years	Q1	0.24	*0.15*	0.06	*0.12*
60–64 years	Q1	–0.29	*0.18*	0.05	*0.23*
65–74 years	Q1	–0.10	*0.08*	0.03	*0.17*
Total	Q8	0.34*	*0.17*	0.40*	*0.18*
16–19 years	Q8	0.34	*0.55*	0.68	*0.59*
20–24 years	Q8	0.87*	*0.42*	0.62*	*0.31*
25–29 years	Q8	0.56	*0.34*	0.57	*0.43*
30–34 years	Q8	0.44	*0.24*	0.45	*0.25*
35–39 years	Q8	0.30	*0.19*	0.26	*0.24*
40–44 years	Q8	0.36*	*0.18*	0.35	*0.19*
45–49 years	Q8	0.49*	*0.23*	0.25	*0.20*
50–54 years	Q8	0.12	*0.12*	0.53*	*0.21*
55–59 years	Q8	0.52*	*0.26*	0.41*	*0.20*
60–64 years	Q8	–0.16	*0.18*	0.03	*0.28*
65–74 years	Q8	–0.30*	*0.14*	0.06	*0.24*

Note: The change in GDP is standardised to one standard deviation in the first period. This corresponds to seasonally-adjusted quarterly growth of 0.8 per cent. The effects on employment are measured as the change in the proportion of the population in each age group. The table presents the cumulative effects after one and eight quarters and the standard error in the estimation. Mainland GDP is the seasonally-adjusted volume change from the quarterly national accounts, while employment is taken from the LFS.

* indicates that the size of the coefficient is at least two standard errors.

Table 9 GDP shocks – effect on the labour force. Percentage point change

		Women		Men	
	Time from shock	Effect	*St. error*	Effect	*St. error*
Total	Q1	–0.01	*0.05*	0.05	*0.04*
16–19 years	Q1	–0.32	*0.32*	0.27	*0.44*
20–24 years	Q1	0.26	*0.25*	0.29	*0.17*
25–29 years	Q1	0.00	*0.17*	0.26	*0.14*
30–34 years	Q1	0.02	*0.16*	0.05	*0.12*
35–39 years	Q1	0.11	*0.11*	0.02	*0.10*
40–44 years	Q1	0.22*	*0.10*	0.04	*0.07*
45–49 years	Q1	0.21	*0.12*	0.04	*0.09*
50–54 years	Q1	–0.09	*0.13*	0.10	*0.09*
55–59 years	Q1	0.18	*0.15*	0.07	*0.12*
60–64 years	Q1	–0.35*	*0.17*	0.01	*0.23*
65–74 years	Q1	–0.07	*0.08*	0.05	*0.17*
Total	Q8	0.14	*0.10*	0.17	*0.10*
16–19 years	Q8	0.20	*0.55*	0.61	*0.57*
20–24 years	Q8	0.49	*0.36*	0.31	*0.24*
25–29 years	Q8	0.24	*0.24*	0.22	*0.22*
30–34 years	Q8	0.29	*0.19*	0.09	*0.13*
35–39 years	Q8	0.05	*0.14*	0.07	*0.15*
40–44 years	Q8	0.28*	*0.12*	0.08	*0.09*
45–49 years	Q8	0.40	*0.23*	0.17	*0.18*
50–54 years	Q8	0.11	*0.16*	0.37*	*0.11*
55–59 years	Q8	0.44	*0.23*	0.44*	*0.20*
60–64 years	Q8	–0.18	*0.19*	0.03	*0.29*
65–74 years	Q8	–0.29*	*0.13*	0.07	*0.24*

Note: The change in GDP is standardised to one standard deviation in the first period. This corresponds to seasonally-adjusted quarterly growth of 0.8 per cent. The effects on the labour force are measured as the change in the proportion of the population in each age group. The table presents the cumulative effects after one and eight quarters and the standard error in the estimation. Mainland GDP is the seasonally-adjusted volume change from the quarterly national accounts, while the data for the labour force are taken from the LFS.

* Indicates that the size of the coefficient is at least two standard errors.

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