DISINFLATION AND EQUILIBRIUM PARTICIPATION RATES ACROSS THE OECD

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Abstract

Larry Ball's recent work shows that OECD countries with large and long lasting disinflations during the 1980s had the largest rises in their equilibrium unemployment rates. While supply side factors did not initiate the rises in equilibrium unemployment, Ball finds evidence for an interactive relationship between disinflation and open ended unemployment duration. He concludes that the results support the theory that disinflation has a permanent impact on unemployment (hysteresis) over the theory that there is a unique equilibrium rate of unemployment that is invariant to disinflation (the natural rate hypothesis). A hysterisis theory also implies, in addition to trend unemployment rates, that trend labour force participation should be changed by disinflation. The study examines changes in trend participation across twenty OECD countries between 1980 and 1990 and finds confirmation for the prediction of the hysteresis hypothesis. Countries with high disinflation have the smallest rises in trend labour force participation. Some evidence was found in support of an interactive relationship between disinflation and benefit duration. For a given disinflation, the greater the duration of unemployment benefit payments, the smaller the rise in trend labour force participation. The results of both this study and that of Ball raise important issues regarding the current operating structures of monetary policy in New Zealand, based as these are on the natural rate hypothesis.

Why did equilibrium unemployment rise across the Western world during the decade of the 1980s? Was it because of growing supply-side barriers to the competitive operation of the labour market? Was it because of a relative shift in demand against unskilled workers? Or was it due to the disinflationary macroeconomic policies followed by governments?

The first two are the mainstream explanations advanced respectively by Layard et. al. (1991) and Krugman (1994). The last explanation is one tested by Ball (1996). Having obtained data on increases in equilibrium unemployment in each of the 20 OECD countries over the decade between 1980 and 1990, Ball shows that OECD economies with larger disinflations between 1980 and 1990 had bigger rises in their equilibrium unemployment rates. In addition, longer disinflations were found to be associated with larger rises in equilibrium unemployment. While supply side factors in the labour market were not found to play an initiating role in increasing unemployment, Ball finds evidence of an interactive effect between disinflation and open ended unemployment benefit duration. An open ended benefit system is found to magnify the impact of disinflation on equilibrium unemployment.

Ball suggests that disinflation impacts on equilibrium unemployment via a path dependence or hysteresis mechanism. The story he favours is one where unemployed workers construct social networks which lower the costs over time of being without work. In Ball's words "workers who lose their

jobs become accustomed to an unemployed lifestyle, stop searching for work, and become detached from the labour force" (Ball 1996, p. 13).

Ball's work casts doubt on the conventional belief that the process of reducing inflation has only transitory effects on unemployment. More speculatively, it suggests that if an OECD country were to pursue an expansionary macroeconomic policy which increases inflation this might, under some circumstances, lead to permanently lower unemployment. However, for expansion to lower unemployment in exactly the same manner, the path dependent response must be symmetrical.

Given the relatively stringent criteria for being classified as actively seeking work in most official measures of unemployment, if the unemployed adjust to being jobless in the fashion described above one would expect that a significant number of these people to exit the labour force. Hence a hysteresis theory of OECD unemployment also predicts that equilibrium *participation rates* should be changed by disinflation in addition to equilibrium *unemployment rates*. If they are not, it casts doubt on a hysteresis story.

Having examined data on changes in equilibrium participation rates for twenty OECD economies over the 1980 to 1990 period, I find confirmation for the prediction of the hysteresis hypothesis. Countries with higher disinflation over the 1980s had lower growth in trend labour force participation rates. However, while significant interactive effects are

found between disinflation and benefit duration on one hand and trend labour force participation on the other, it is also possible that open ended benefits may have a significant independent impact on trend participation. In addition in some specifications, the degree of union coordination, a supply-side variable, has a significant negative impact on trend labour force participation.

Actual and trend participation rates

The labour force participation rate measures the proportion of the working age population actively engaged in the labour market. It is the ratio of the employed plus the unemployed to the working age population. As a stylised fact, the participation rate is generally considered to fluctuate pro-cyclically, rising in expansions and declining in contractions. Econometric evidence generally confirms this, with some suggestion that cyclicity is greater for females than for males (see Pencavel 1986:10-13; Killingsworth and Heckman 1986:122).

In the longer run, in considering labour supply economists have had more to say about hours of work supplied than about labour force participation rates. However, the main point of interest is that mainstream economic theory predicts that there is some equilibrium or trend participation rate which should be independent of nominal fluctuations. In other words, changes in the inflation rate (positive or negative disinflation), a nominal shock, should have no significant impact on trend labour force participation, a real outcome.

Data on labour force participation rates were obtained from the OECD for the twenty countries considered by Ball.[1] To construct the change in trend labour force participation rate for the period 1980 to 1990 a Hodrick-Prescott trend was applied to the data from all countries from 1975 to 1994.[2] As an alternative measure, the trend adjustment was also applied to data between 1965 and 1994. In addition to these twenty countries, data is available on participation rates for Turkey and Iceland. Both these countries had very high inflation rates in 1980 (Turkey at 110 percent and Iceland at 56 percent) and very large disinflations over the decade (Turkey 48.2 percent and Iceland 40.9 percent). Because they are outliers by a wide margin, and to be consistent with Ball, these two economies were omitted from the sample. Turkey had a substantial trend fall in participation (-9.5 percent) and Iceland a significant rise (3.2 percent) between 1980 and 1990 (both calculated between 1975 and 1994).

The dependent variable was constructed by taking the change in the trend participation rate for each of the twenty countries between 1980 and 1990. The next section examines the possible causes.

Causes of changes in trend participation across the OECD

The change in the trend participation rates between 1980 and 1990 were calculated for each of the twenty OECD economies. A range of possible supply-side explanatory variables

also used by Ball (1996) were taken from Layard, Nickell and Jackman (1991) and the OECD (1994). These include:

- Factors to do with the structure and coordination of labour market bargaining (the degree of corporatism, union and employer coordination).

- Government policy influences on the labour market (replacement rates, benefit duration, expenditure on active labour market programmes as a proportion of average output per person), and;

- The proportion of the work force unionised.

On the demand side a variety of measures were taken from Ball (1996) and the OECD (1995). These include:

- Disinflation (the negative of the change in inflation between 1980 and 1990).

- The length of the longest disinflation between 1980 and 1990 (the longest number of consecutive March years between 1980 and 1990 when inflation declined), and;

- The square of the length of the longest disinflation.

The immediate problem which arises in this context is undertaking cross-sectional econometric work with limited degrees of freedom and a large number of potential explanatory variables. The approach followed was to run a series of simple regressions using each of the explanatory variables separately to investigate the size of the correlation and the significance of the t statistics on the coefficient. Regressions reported in Table 1 show relatively high negative correlations between changes in trend participation and levels of corporatism, union coordination of bargaining and particularly unemployment benefit duration. This is somewhat different from Ball's conclusions, which showed that simple regressions between changes in trend unemployment rates and various supply side variables generated very low correlations. However, as in Ball's work, quite strong correlations are found between rises in trend participation and various measures of disinflation. Regressing changes in trend participation against the interactive variables suggests, as in Ball's work, that disinflation and benefit duration combined have an additional impact in combination in terms of raising the significance of the explanatory variable as well as the fit of the estimated equation.

The next step was to include the various significant variables in a common equation. While corporatism showed a strong correlation and t statistic in the simple regression, it was not included in the multiple regression because the full number of observations was not available.

The first set of equations run included the demand variables and the two significant supply side measures in a single regression explaining trend participation. Results reported in Table 2 suggest that disinflation performs better as a demand variable, with a higher level of significance and a higher fit in the regression including it than that including

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Table 1. Explaining changes in trend labour force participation rates between 1980-1990, by OECD member

	R^2	t statistic on explanatory variable	N
Supply side			
Replacement rate	.01	0.48	19
Corporatism	.22	-2.17	19
Union coordination	.15	-1.79	20
Employer coordination	.01	0.42	20
Benefit duration	.39	-3.38	20
Expenditure on labour market programmes	.07	-1.12	19
Union density	.05	-0.94	19
Demand side			
Disinflation	.21	-2.16	20
Length of longest disinflation	.21	-2.21	20
Length squared of longest disinflation	.20	-2.09	20
Interactive			
Length x benefit duration	.45	-3.83	20
Length squared x benefit duration	.33	-2.94	20
Disinflation x benefit duration	.42	-3.61	20

Source: Union density figures were taken as the average of the 1980 and 1990 numbers provided by the OECD (1994, Part II, p. 10). All other supply side variables were from Layard, Nickell and Jackman (1991) excepting benefit duration from Ball (1996). All demand side variables were taken from Ball (1996). [3]

length of the longest disinflation. In addition, union coordination reduces to below five percent significance where the length of longest disinflation is used as a demand variable. Where union coordination is significant, the regressions suggest that nationally coordinated unions are successful in protecting insiders by continuing to keep outsiders (those not in the labour market) out over time.

Table 2. Supply and demand side variables and changes in trend participation

	Equation 1	Equation 2
Intercept	6.694 (6.39)	5.795 (5.387)
Disinflation	-0.216 (-3.167)	-
Length of longest disinflation	-	-0.440 (-2.255)
Union coordination	-1.031 (-2.541)	-0.783 (-1.750)
Benefit duration	-0.682 (-3.685)	-0.682 (-3.302)
R^2	0.679	0.604
N	20	20

My next step was to run the same regressions but combining the demand variable with benefit duration to create one interactive variable. The results, presented in Table 3, give a stronger t statistic than on either of the two variables entered separately and also improve the significance of the

union coordination variable. There is a small decline in the fit (some decline is of course inevitable given that fewer variables are involved). Since the interactive equation is also a more parsimonious specification, it is probably to be favoured over the linear equation.

Sensitivity analysis

This section examines the sensitivity of the results along a number of dimensions, including an alternative calculation of changes in trend labour force participation, the issue of causation and the issue of coding unemployment benefits of indefinite duration. The qualitative results regarding the significance of the disinflation variables are found to be remarkably robust to the various sensitivity checks.

Alternative de-trending

The dependent variable is calculated from de-trended participation between 1975 and 1994. Does using an alternative period to de-trend change the qualitative results? As an alternative, the dependent variable was calculated de-trending from 1965 to 1994 as an alternative. The results are shown in Tables 4 and 5. The fits are substantially lower, but in all cases, both linear and interactive, the impact of aggregate demand remains significant. Again, benefit duration remains significant but union coordination becomes insignifi-

Table 3. Interactive supply and demand side variables and changes in trend participation

	Equation 1	Equation 2
Intercept	5.620 (5.851)	5.025 (4.908)
Disinflation x benefit duration	-0.087 (-4.803)	-
Length x benefit duration	-	-0.148 (-3.949)
Union coordination	-1.324 (-3.217)	-0.922 (-2.026)
R^2	0.639	0.557
N	20	20

Table 4. Supply and demand side variables and changes in trend participation under alternative de-trending of labour force participation

	Equation 1	Equation 2
Intercept	5.061 (3.923)	4.503 (3.822)
Disinflation	-0.179 (-2.122)	–
Length of disinflation squared	–	-0.046 (-2.167)
Union coordination	-0.484 (-0.968)	-0.312 (-0.633)
Benefit duration	-0.564 (-2.470)	-0.543 (-2.380)
R^2	0.449	0.454
N	20	20

Table 5: Interactive supply and demand side variables and changes in trend participation under alternative de-trending of labour force participation

	Equation 1	Equation 2
Intercept	4.054 (3.382)	3.843 (3.579)
Disinflation x benefit duration	-0.067 (-2.946)	–
Length x benefit duration	–	-0.139 (-3.544)
Union coordination	-0.712 (-1.386)	-0.375 (-0.785)
R^2	0.365	0.448
N	20	20

cant. The latter result casts a question mark over the effectiveness of the ability of union coordination to exclude outsiders from the labour market.

Causality

A question arises regarding whether a stronger rise in trend participation causes or is caused by lower disinflation or whether large falls in inflation are in fact strongly correlated with high inflation rates in 1980. One might hypothesize that, by obscuring price signals, high inflation rates in 1980 are associated with lower changes in trend participation over the decade. The hypothesis that the change in inflation causes the change in trend participation can be tested. It implies that if disinflation is split into inflation in 1980 and in 1990 in the regression, the coefficients will take on equal and opposite signs. This restriction can be readily tested. For the 1975-1994 de-trended data, the F test on the restriction that when entered separately inflation in 1990 and in 1980 have the equal and opposite sign took on a value of 3.97, within the critical value of 4.38. Therefore the restriction cannot be rejected. For the 1965-1994 de-trended data, the F test took on a value 0.16, well within the critical value.

The values of the inflation coefficients in the unrestricted equations and their t statistics are shown in Table 6. While the F test suggests the restriction can be accepted, inflation in 1980 is much more significant than inflation in 1990. Thus there is at least some tentative support in favour of the relative prices hypothesis.

Table 6. Coefficients on inflation in the unrestricted equations

	1975-1994 de-trending	1965-1994 de-trending
1980 inflation	-0.229 (-3.637)	-0.175 (-2.012)
1990 inflation	0.0395 (0.363)	0.228 (1.523)

Coding open ended benefit systems

Following both Ball (1996) and Layard, Nickell and Jackman (1991), indefinite benefit duration is arbitrarily coded at four years. How sensitive are the results to changes in the coding of open ended benefits? The results are reported in Table 7 and 8. Econometric experimentation with 6, 10 and 14 years shows that qualitative conclusions do not appear to be at all sensitive to alternative coding in terms of equations which use either the size of disinflation or the longest disinflation. Both the duration of unemployment benefits and union coordination remained significant at a five percent level. There was some tendency for the demand variable to grow in size and become slightly more significant as coding of indefinite duration increased. Similar results (not reported) were found using alternative indefinite coding for the trend participation rate changes calculated using 1965-1994 data.

Table 7. Disinflation coefficients under alternative indefinite unemployment benefit coding

Coding of open ended benefits	Disinflation	Length
6 years	-0.233 (-3.388)	-0.524 (-2.768)
10 years	-0.244 (-3.456)	-0.585 (-3.073)
14 years	-0.248 (-3.463)	-0.607 (-3.165)

Table 8. Interactive coefficients under alternative indefinite unemployment benefit coding

Coding of open ended benefits	Disinflation x benefit duration	Length x benefit duration
6 years	-0.061 (-4.735)	-0.109 (-4.066)
10 years	-0.035 (-4.280)	-0.062 (-3.625)
14 years	-0.024 (-4.016)	-0.041 (-3.340)

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Conclusion

Findings regarding the causes of changes in trend participation by OECD economy between 1980 and 1990 support the path dependence hypothesis. These findings are consistent with Ball's conclusions regarding causes of rising equilibrium unemployment across the OECD and thus are further support for the belief that path dependence may be of macroeconomic importance. Both equilibrium unemployment and trend participation appear to have responded to the disinflation of the 1980s in a manner consistent with hysteresis theories and inconsistent with macroeconomic theories ranging from real business cycle and new classical monetary misperceptions models through to Keynesian and monetarist theories involving adaptive expectations and long run monetary neutrality.

However, my results also differ from Ball's in some respects. While like Ball, I find some evidence for interactive effects between disinflation and unemployment benefits, I find more evidence than he for the suggestion that several supply-side variables may have played a significant independent role in determining longer run labour market outcomes. In particular, both benefit duration and the level of union coordination in the bargaining process have had significant negative impacts on trend labour force participation changes. The evidence regarding the impact of the benefit system is somewhat stronger than that for union coordination, since under an alternative de-trending procedure for participation, union coordination loses its significance.

The results regarding the significance of aggregate demand,

either linearly or interactively, are substantively robust to the sensitivity analysis undertaken. Qualitative conclusions regarding the impact of aggregate demand on participation are found to be invariant to an alternative de-trending and to different methods of coding open ended unemployment benefits. In addition, tests cannot reject the restriction that the inflation rates in 1980 and 1990 have equal and opposite signs, which suggests that causality runs from the change in inflation to trend participation.

In combination with Ball's work, the above results casts doubt on the conventional wisdom, which underpins New Zealand's Reserve Bank Act and also macroeconomic policy followed since 1984, that the process of reducing inflation has only transitory effects on the labour market. There do appear to be permanent labour market costs of changing the inflation rate. The speculative question that then arises is whether there are permanent labour market benefits of raising the inflation rate by pursuing an expansionary macroeconomic policy. The most extreme possibility is that the relationship is perfectly asymmetric: reductions in inflation have permanent negative effects on the labour market while increases in inflation have no positive effect. Therefore an activist expansionary policy would be totally ineffective. This strong corner case seems exceedingly unlikely. The work certainly provides one justification for consideration of a more expansionary monetary policy.

Future Research

Future work in the area would be valuable. Laurence Ball has suggested that disaggregating labour force participation by gender and running a similar analysis would be of consider-

Table 9. Main data used

Country	Participation change, 1965-1994 trend	Participation change 1975-1994 trend	Disinflation	Longest disinflation	Benefit duration	Union coordination
Australia	2.3	2.6	2.9	2	4	2
Austria	0.1	0.2	3.0	3	4	3
Belgium	0.5	0.3	3.3	4	4	2
Canada	4.8	4.4	5.4	4	0.5	1
Denmark	2.8	2.3	9.7	6	2.5	3
Finland	1.0	0.2	5.5	5	4	3
France	-0.7	-1.1	10.2	6	3.75	2
Germany	0.7	1.2	2.8	5	4	2
Ireland	-1.1	-0.4	15.0	7	4	1
Italy	0.7	0.6	15.1	7	0.5	2
Japan	2.1	2.8	4.7	3	0.5	2
Netherlands	-0.4	0.7	4.0	3	4	2
NZ	-0.9	-1.4	11.0	4	4	2
Norway	3.6	2.6	6.8	4	1.5	3
Portugal	2.4	1.3	3.2	3	0.5	2
Spain	-0.8	-0.3	8.9	8	3.5	2
Sweden	1.6	0.4	3.2	4	1.2	3
UK	4.4	1.3	8.5	3	4	1
USA	1.4	4.8	8.1	3	0.5	1
Switzerland	4.9	6.5	-1.4	3	1	1

able interest. While undertaking such a project would require a substantial data collection exercise, the results would be of considerable interest.

Notes

1. I am indebted to Peter Sturm and Jorgen Elmskov of the OECD for their timely assistance in providing me with the data.

2. l in the smoothing equation was set to 1,600.

3. Layard, Nickell and Jackman do not provide these supply side variables for all twenty OECD economies. For union coordination, I assumed Portugal took on a value of 2 (out of either one, two or three), the same as that of Spain, to bring observations up to the full complement of twenty. Ball provides a number for benefit duration for Portugal, again bringing Layard, Nickell and Jackman's data up to the full complement. For employer coordination a value of one was assumed for Portugal, the same as for Spain, to complete Layard, Nickell and Jackman's data set. Updating other supply side variables was less straightforward and was not undertaken.

Appendix: data issues

The base data on labour force participation rates were provided by the OECD from two sources. Peter Sturm from the OECD provided a spreadsheet with participation rate data for OECD economies with data beginning in 1960 (exceptions were France and Mexico, where data began in 1965 and 1987 respectively). The end points of the OECD participation rate data set were as follows: 1994 or later (13 countries): United States, Japan, Germany, Canada, Austria, Denmark, Finland, Ireland, the Netherlands, New Zealand, Spain, Sweden, Switzerland, 1993 (five countries): France, Italy, the United Kingdom, Australia, Norway, 1992: Belgium, 1991: Portugal. Data was also available for the period 1979-1994 from an OECD publication (OECD 1995). In most cases it was directly comparable. The former data set was updated using the latter numbers.

Disinflation numbers were taken from the June 1995 OECD *Economic Outlook*. Regarding length of disinflation, New Zealand was re-coded with four years as the longest disinflation rather than Ball's two. This takes out the impact of the supply side shock of the imposition of a goods and services tax (GST) of 10 percent in late 1986 and a rise in the GST rate during 1989 of 2.5 percent.

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