The Economic and Social Review, Vol. 14, No. 2, January 1983, pp. 93-118

Unemployment Duration, Aggregate Demand and Unemployment Insurance: A Study of Irish Live Register Survival Probabilities, 1967-1978

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Abstract: Quarterly data on the duration of unemployment for males and females are used to derive measures of the probability of remaining on the Live Register for another quarter for persons who have been on the register for very short, short, medium, and long durations. A logit transformation is applied to the survival probabilities and a general model of unemployment is tested to see if it can account for variations in the probability of remaining unemployed for these four duration categories during the period 1967-78. Regression results suggest that the survival probabilities are responsive to changes in the maximum period for which unemployment benefits are payable and to changes in labour market conditions. The results are used to derive the survival probabilities which would have obtained if there had been no change in the unemployment insurance (UI) variables. These hypothetical values are used in conjunction with the actual values within a demographic projection framework to estimate the effects which changes in the UI variables may have on the steady state level of the Live Register.

I INTRODUCTION

The sharp increase in Irish long-term unemployment during the 1970s, whether measured in terms of the proportion on the Live Register (LR) who have been continuously registered for 27 weeks or longer, or the proportion of urban male registrants who have been out of work for at least a

*We are grateful to Terry Corcoran, Patrick Honohan, Ian Irvine and Colm McCarthy for comments on an earlier draft of this paper when it was presented at the Annual Conference of the Irish Association of University Teachers of Economics held at Renvyle, April 1982, to Denis Conniffe and John Kennan for their advice on econometric points, to John FitzGerald and Barry Reilly for programming assistance, and to John Martin and one of this Journal's referees for a number of helpful comments and suggestions. The usual disclaimer applies.

year, has been documented by O'Mahony (1983B) in this issue. While to some extent this rise in long-term unemployment during the 1970s could be regarded as a continuation of a trend noted by Walsh (1974) in the data for the 1960s, Short (1980) has shown that there was a break in the trend sometime during the 1970s, with the rate of growth of long-term unemployment accelerating in the more recent period. In view of the significant changes in unemployment insurance (UI) during the 1970s, in particular the introduction of the pay-related supplement in 1974, it is natural to ask whether any of the altered behaviour of the duration of unemployment can be attributed to this source. More generally, there is an obvious need to try to establish the relative importance of different factors in accounting for the present level and distribution by duration of unemployment. This study attempts to shed light on these issues through an econometric investigation of LR survival probabilities.

II LABOUR FORCE TRANSITION PROBABILITIES

Ideally, longitudinal data on the population would permit a study of the behaviour of the following flows over time:

		Status in t + 1		
		E	U	N
Status in t	E	EE	EU	EN
	U	UE	UU	UN
	N	NE	NU	NN

where E, U, N represent the numbers employed, unemployed and not in the labour force respectively, and, for example, UE is the number moving from unemployment to employment over the period. Each flow can be converted to a survival probability by dividing by the relevant initial stock.

Much of the published research on the duration of unemployment concentrates on the length of spells of unemployment measured in micro-data drawn from household surveys (see, for example, Nickell, 1979). In the present study our data relate to a measure of the "survival" probability, UU, obtained from returns of registered unemployment classified by duration of unemployment. The labour market and other variables that influence this probability are explored in our statistical analysis, which follows closely the approach used by Björklund and Holmlund (1981) on US and Swedish data. In addition to exploring the role of various factors in the time series behaviour of the survival probabilities, we also use our results to simulate steady state levels of unemployment under different assumptions concerning policy-relevant variables.

Our data source for measuring the probability of remaining on the Live Register is the tabulation of the numbers unemployed by duration of registration published quarterly from 1966:4 to 1979:4. (In 1980 this series was replaced by a semi-annual tabulation of duration by age.) Because the length of time between some of the early surveys varied, we confined our attention to the period 1967:3 to 1978:4 but even within this period there are two quarters for which the surveys were not conducted, and there are, therefore, four dates for which observations are missing. We excluded farmers, those aged over 65, and those signing on for credits from our data.

Our dependent variable is

$$p_t^d = s_{t+1}^{d+1} / s_t^d$$

where p_t^d = the probability of surviving on the LR over a three-month period among those who had been registered for duration d at period t, s_t^d.

The available data allow the precise calculation of this probability for only one category of the unemployed, namely, those who were on the LR for 0-13 weeks in a quarter and who, if they remained on the LR until the next quarter, would show up as those in the 13-27 weeks' duration category. We refer to this as the short-run unemployment survival probability,

$$p_t^s = s_{t+1}^{13\text{-}27} / s_t^{0\text{-}13}$$

A second measure can be calculated by assuming that the numbers registered for under one week at the time of the quarterly survey are a good estimate of the weekly inflow over the quarter. On this assumption a "very short-run" survival probability p_t^{vs}, can be constructed as

$$p_t^{vs} = s_t^{0\text{-}13} / \tfrac{1}{2}(s_t^{<1} + s_{t+1}^{<1})\ 13$$

A third measure may be constructed by relating those who are registered 13 weeks or more in one quarter to those who are registered 27 weeks or more, which we refer to as the long-term unemployment survival probability

$$p_t^{\ell} = s_{t+1}^{27+} / s_t^{13+}$$

This measure is, however, unsatisfactory in that it refers to a very heterogeneous group of persons, some of whom have been registered as unemployed for as short as three months or as long as a year or more. Several writers (e.g., Salant (1977)) emphasise that survival probabilities are likely to vary significantly according to duration of unemployment and this consideration greatly reduces the appropriateness of a measure such as p_t^{ℓ} in the study of unemployment.

The only alternative way of measuring survival probabilities at the medium durations with the duration categories used in the surveys is to assume that

the distribution within the interval 27-53 weeks is stable over time, and thus to take some fraction of this number as an estimate of the numbers in the 27-40 weeks duration. Arbitrarily setting this fraction at one half, we have used this fourth ratio as a measure of the medium-term unemployment survival probability:

$$p_t^m = \tfrac{1}{2}\, s_{t+1}^{27\text{-}53} / s_t^{13\text{-}27}$$

It is clear from the manner in which they have been constructed that only p_t^{vs} and p_t^s are comparable three-month survival probabilities. The variables p_t^m and p_t^ℓ should not be compared either with each other or with p_t^{vs} or p_t^s; only the period-to-period variation in each of these series is of interest.

We have calculated these four probabilities for males and females, and separately for those on unemployment assistance (UA), unemployment benefits (UB) and the total (UT). (We separate UT and UB because there is some uncertainty as to whether "duration of continuous registration" is always interpreted to refer to registration on the LR or registration for a specific type of payment; see Short (1980).) The category UA is of little labour market interest as far as women are concerned because of the very small number who obtained UA during our data period and it has not been included in our analysis. The survival probabilities are shown in Table 1. In general, the data show that females are slightly less likely than males to remain on the LR in receipt of UB over a three-month period. This agrees with Fowler's (1968) findings for Britain. It does not, of course, follow that women are more likely to be re-employed after a spell of unemployment, as sizeable numbers may withdraw from the labour force on leaving the LR.

The series in Table 1 have been adjusted for seasonality using the US Bureau of the Census X-11 program.[1] The seasonally adjusted series for male-UB claimants is shown in Figure 1. All the series, except p_t^s for UA males, exhibit stable seasonality at the 1 per cent level (Table 2). Seasonality is most pronounced among short-term UB receipients. The general pattern of seasonality is for p^d to rise in the first, and to fall in the second, quarter while values close to the annual average are recorded in the third and fourth quarters. In view of the manner in which these probabilities are measured, this implies that the months December, January and February are the worst, and March, April and May, the best, for getting off the LR.

The survival probabilities for p^{vs} and p^s are not directly comparable because people who come on to the Live Register during the quarter in which each survey is taken do not have the same amount of time to leave the register as

1. Since this program requires unbroken series to operate, we interpolated missing observations by using the average value for the relevant quarter in preceding years.

Table 1: *Survival probabilities for very short, short, medium and long-term unemployed: males and females, 1967:3-1978:4*

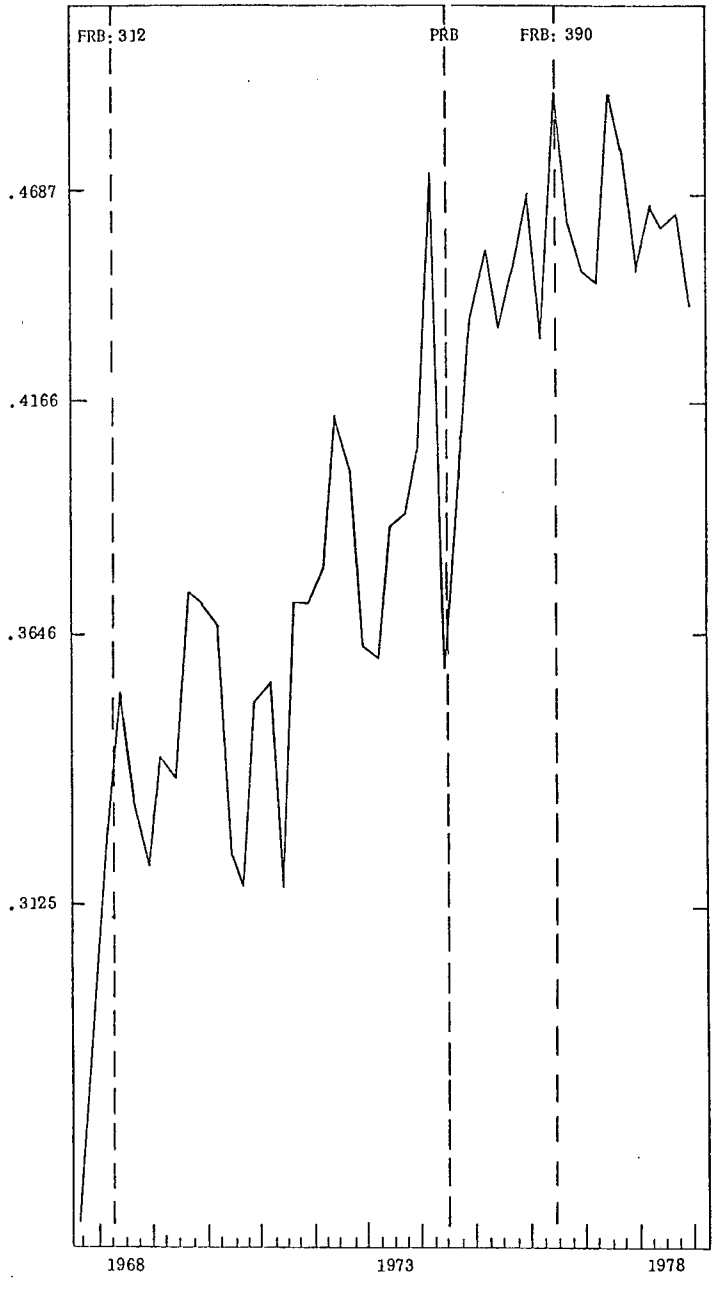
Week ending	Males												Females			
	Very short			Short			Medium			Long			Very short	Short	Medium	Long
	UB	UA	UT	UB	UA	UT	UB	UA	UT	UB	UA	UT	UB	UB	UB	UB
25 August 1967	.4344	.7434	.5122	.2300	.3714	.2783	.0545	.5039	.2249	.107	.667	.445	.5468	.3199	.0386	.068
24 November 1967	.5653	.6909	.5997	.3078	.3906	.3410	.1405	.6044	.3519	.277	.790	.640	.6009	.2889	.0486	.096
23 February 1968	.7035	.7460	.7151	.4254	.4404	.4301	.2760	.5428	.3900	.521	.727	.660	.6364	.4201	.1329	.281
31 May 1968	.4973	.5747	.5164	.2672*	.3474*	.2899*	.2895	.4873	.3534	.483	.714	.607	.4784	.2946*	.1347	.253
30 August 1968	.5275	.6384	.5534	.2954	.4003	.3242	.3073	.4706	.3626	.416	.693	.560	.5603	.3038	.1563	.260
29 November 1968	.5906	.6710	.6099	.3382	.4529	.3692	.4911	.6785	.5547	.571	.802	.700	.6717	.2939	.2383	.336
28 February 1969	.6660	.7360	.6808	.4411	.4904	.4541	.5224	.6216	.5552	.622	.844	.740	.6102	.4266	.3282	.481
30 May 1969	.4464	.7892	.5212	.2567	.4550	.3021	.2952	.4551	.3408	.421	.696	.550	.4037	.2779	.1673	.283
29 August 1969	.6432	.7029	.6617	.3349	.4002	.3565	.3513	.4935	.4003	.447	.751	.598	.8185	.4474	.1705	.265
28 November 1969	.7468	.7139	.7374	.3933	.4375	.4079	.5205	.6777	.5788	.591	.848	.731	.8436	.3581	.2046	.304
27 February 1970	.7098	.7757	.7250	.4666	.5274	.4835	.5551	.7572	.6267	.660	.884	.782	.7049	.4612	.2911	.463
May 1970	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
28 August 1970	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
27 November 1970	.6036	.7034	.6295	.3696	.4843	.4045	.4413	.6933	.5273	.526	.826	.686	.5812	.3562	.2788	.400
February 1971	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
28 May 1971	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
27 August 1971	.6448	.6594	.6484	.3414	.4717	.3798	.4379	.6003	.4875	.484	.829	.656	.6050	.3931	.1908	.295
26 November 1971	.6850	.7138	.6933	.3901	.5720	.4356	.5783	.6568	.6070	.662	.863	.772	.6891	.3746	.2431	.357
25 February 1972	.6663	.6295	.6555	.4632	.5475	.4882	.5884	.7616	.6453	.661	.894	.783	.6592	.4497	.2841	.445
26 May 1972	.5876	.7385	.6272	.3335	.4690	.3717	.3984	.5805	.4591	.505	.845	.674	.5947	.3733	.2093	.336
25 August 1972	.6612	.7219	.6782	.3718	.4450	.3944	.4698	.6297	.5266	.511	.812	.673	.6771	.4196	.2122	.320
24 November 1972	.6506	.7045	.6666	.3781	.4909	.4118	.5429	.6969	.5965	.549	.852	.720	.6479	.3821	.2239	.327
23 February 1973	.6566	.6567	.6567	.4305	.4827	.4469	.6016	.7875	.6677	.622	.894	.780	.6748	.4211	.3330	.522
25 May 1973	.5025	.5920	.5308	.3239	.4641	.3645	.4364	.6877	.5216	.477	.826	.675	.5295	.4000	.2295	.309
31 August 1973	.6635	.7052	.6775	.3655*	.4688	.4019*	.4552	.6248	.5200	.466	.793	.664	.6884	.3559*	.2258	.339
30 November 1973	.6627	.7710	.6936	.4197	.5079	.4504	.5590	.6717	.6053	.566	.855	.751	.7247	.3580	.2716	.366
22 February 1974	.7010	.7795	.7214	.5559*	.6089*	.5732*	.6215	.7298	.6640	.666	.897	.813	.6589	.5500*	.3231	.468
31 May 1974	.5001	.7499	.5597	.3060*	.4756*	.3533*	.4462	.6933	.5317	.515	.823	.700	.5664	.3473	.2342	.369
30 August 1974	.5774	.7462	.6199	.3796	.5366	.4298	.4770	.6746	.5513	.501	.841	.711	.6099	.4192	.2464	.355
29 November 1974	.7832	.7327	.7697	.4477	.5609	.4821	.6188	.7818	.6839	.659	.861	.789	.6066	.4121	.2634	.379
28 February 1975	.9300	.8506	.9104	.5231	.5569	.5317	.6264	.7484	.6695	.678	.948	.840	.6990	.4189	.2923	.460
30 May 1975	.8031	.8545	.8153	.3814	.5116	.4113	.4298	.7498	.5150	.557	.880	.730	.6595	.3313	.3074	.483
29 August 1975	.7655	.8982	.7987	.4284	.5348	.4548	.4843	.7188	.5514	.556	.863	.718	.6307	.3545	.2725	.350
28 November 1975	.7000	.7978	.7272	.4736	.4642	.4935	.4975	.7879	.5824	.535	.870	.712	.6556	.3541	.2609	.361
27 February 1976	.7076	.7505	.7212	.4933	.5317	.5050	.5072	.7015	.5675	.565	.902	.746	.7009	.4353	.3510	.504
28 May 1976	.7397	.7228	.7343	.4400	.4476	.4425	.4610	.6478	.5211	.568	.827	.709	.6232	.3806	.2701	.406
27 August 1976	.7506	.9276	.8041	.4456	.5136	.4671	.4763	.6432	.5321	.574	.827	.712	.6096	.3959	.2984	.449
26 November 1976	.7501	.8128	.7710	.4485	.5093	.4697	.4733	.6817	.5458	.570	.851	.726	.6343	.3676	.2887	.437
25 February 1977	.7191	.7616	.7344	.5025	.5517	.5198	.5450	.6955	.6018	.668	.840	.767	.7046	.4455	.3192	.512
27 May 1977	.6491	.6670	.6556	.4452	.4594	.4505	.4644	.6424	.5308	.555	.857	.724	.6625	.4121	.2781	.430
26 August 1977	.6702	.7049	.6827	.4711	.4925	.4791	.4697	.6607	.5423	.566	.837	.726	.7175	.4340	.2791	.420
25 November 1977	.6781	.6665	.6737	.4435	.5210	.4723	.4629	.6868	.5485	.565	.821	.720	.6264	.3312	.3033	.461
24 February 1978	.6531	.6345	.6463	.5240	.5293	.5260	.5538	.6930	.6109	.649	.870	.786	.6537	.3909	.3342	.500
26 May 1978	.5825	.6257	.5982	.4153	.4850	.4405	.4221	.6093	.4926	.534	.833	.715	.6589	.3768	.2631	.423
25 August 1978	.7107	.6478	.6863	.4550	.4908	.4686	.4684	.6104	.5250	.559	.802	.712	.6746	.3763	.2760	.442
24 November 1978	.6897	.6048	.6585	.4310	.4829	.4500	.6711	.6594	.5461	.565	.837	.715	.6397	.3298	.2756	.412

Source: CSO quarterly survey of duration of continuous registration on LR.

– = data not available due to absence of survey.

* adjusted to take account of the fact that the interval between surveys was not 13 weeks. The corresponding figures for the very short-term unemployed were not adjusted because the numbers on LR for less than a week at time t – 1 are always multiplied by 13; the figures for the medium- and long-term unemployed cannot be adjusted because no information is available on the numbers on LR for 12-13 weeks.

Figure 1: *Seasonally adjusted survival probabilities for short-term male UB claimants*



FRB:312 and 390 = duration of flat-rate benefit extended to 312 and 390 days.
PRB = pay-related benefit introduced.

Table 2: *F-test for stable seasonality and average seasonal factors for probability of unemployment data, 1967:3-1978:4*

Series	*F-value*	*Average Seasonal Factors in Quarters*			
		I	*II*	*III*	*IV*
UBVSHRTM	32.15	109.7	86.2	98.5	105.1
UAVSHRTM	2.92*	101.8	96.8	101.9	100.3
UTVSHRTM	32.16	107.4	88.9	99.6	103.9
UBVSHRTF	15.57	105.1	85.9	103.2	104.5
UBSHORTM	65.04	121.8	82.2	93.3	102.7
UASHORTM	29.84	109.4	93.0	96.4	102.7
UTSHORTM	72.66	117.1	85.1	94.3	103.0
UBSHORTF	29.87	116.9	90.0	101.8	93.6
UBMEDM	41.30	117.8	82.8	87.0	109.8
UAMEDM	27.00	108.7	90.7	92.3	108.2
UTMEDM	42.90	114.0	84.9	89.9	109.9
UBMEDF	26.70	123.8	87.0	87.1	101.3
UBLONGM	33.47	116.3	90.8	85.3	104.0
UALONGM	19.97	105.1	95.8	95.9	102.6
UTLONGM	36.25	109.3	93.2	92.5	104.1
UBLONGF	32.37	126.9	91.9	86.1	96.7

*Not significant at 1 per cent level.

those who come on to the register in the quarter preceding each survey. If we assume a constant escape rate from unemployment throughout the first 13 weeks of unemployment we can weight new entrants by the number of weeks which they will have to get off the register before each survey is taken and obtain an estimate of the escape rate per week for the very short-term unemployed, u_1. Similarly we can weight the short-term unemployed by the number of weeks which they will have to get off the register during the quarter in which each survey is taken, given that they have already spent 13 weeks on the register. We can then obtain an estimate of the escape rate per week for the short-term unemployed, u_2. These transformations of the survival probabilities p^{vs} and p^{s}, yield escape rates for the first and second quarters' unemployment which are comparable with each other. In our notation the transformations are as follows for the very short-term unemployed

$$s_t^{0\text{-}13} = \tfrac{1}{2}(s_t^{<1} + s_{t+1}^{<1}) \sum_{n=1}^{13} (1 - u_1)^n$$

and

$$s_t^{13\text{-}27} = s_t^{0\text{-}13} (1 - u_2)^{13}$$

for the short-term unemployed.

Noting that the first equation is the sum of a geometric series the Newton-Raphson method can be used to solve for u_1 in

$$\frac{(1 - u_1)^{13} - 1}{(1 - u_1) - 1} = \frac{s_t^{0\text{-}13}}{\frac{1}{2}(s_t^{<1} + s_{t+1}^{<1})}$$

and the solution for u_2 is given by

$$u_2 = 1 - \left(\frac{s_{t+1}^{13\text{-}27}}{s_t^{0\text{-}13}} \right)^{\frac{1}{13}}$$

The weekly escape rates for the two categories of unemployed are shown in Table 3.

Females in the UB and males in the UT categories who are entering the Live Register generally have a greater probability of escaping from unemployment than those who have been registered for three months. The same is broadly true for males in the UB and UA categories but there is a significant number of cases where the probability of leaving unemployment is higher for those who have been on the register for three months than for those entering the register. The escape rates for UB males are generally larger than those for UA males, probably because of the weaker attachment which UA claimants have to the labour force.[2] The tendency for the probability of leaving unemployment to fall as the duration of unemployment rises has been noted in other countries and various explanations have been offered for it. McGregor (1978) for example, notes that both the demand for, and supply of, labour may affect the probability of re-employment as the duration of unemployment lengthens. On the supply side, changes in health, alterations in attitudes to work and discouragement from job-search due to prolonged unemployment may lessen the probability of re-employment. On the demand side, unemployed workers who have been unable to get work quickly may find that employers take their record of long unemployment as an indicator of general unfitness for work. To these factors we would add that changes in unemployment insurance schemes can affect the duration of unemployment through demand or supply factors. Increases in the employer's insurance contribution may affect the demand for labour and changes in the benefits available to unemployed workers may affect the supply of labour. Our interest in this paper lies only in the latter possibility.

2. Up to 1978 recipients of UA included male school leavers and persons who had not accumulated enough contributions to qualify for UB because of their intermittent work histories.

Table 3: *Escape rates per week for very short and short duration unemployed 1967:3-1978:4*

Week ending	Males						Females	
	Very short			Short			Very short	Short
	UB	UA	UT	UB	UA	UT	UB	UB
25 Aug 1967	.1582	.0513	.1228	.1069	.0734	.0770	.1096	.0839
24 Nov 1967	.1029	.0646	.0913	.0866	.0698	.0579	.0909	.0911
23 Feb 1968	.0613	.0506	.0583	.0636	.0611	.0489	.0799	.0645
31 May 1968	.1289	.0996	.1211	.0965	.0781	.0654	.1371	.0897
30 Aug 1968	.1168	.0793	.1071	.0895	.0680	.0597	.1047	.0376
29 Nov 1968	.0943	.0700	.0880	.0800	.0591	.0471	.0698	.0899
28 Feb 1969	.0714	.0530	.0673	.0610	.0533	.0401	.0880	.0634
30 May 1969	.1522	.0406	.1192	.0993	.0588	.0650	.1749	.0938
29 Aug 1969	.0779	.0614	.0726	.0807	.0680	.0530	.0342	.0600
28 Nov 1969	.0505	.0586	.0527	.0693	.0616	.0405	.0289	.0760
27 Feb 1970	.0597	.0437	.0558	.0570	.0480	.0348	.0609	.0578
May 1970	–	–	–	–	–	–	–	–
28 Aug 1970	–	–	–	–	–	–	–	–
27 Nov 1970	.0901	.0613	.0820	.0737	.0542	.0424	.0975	.0763
Feb 1971	–	–	–	–	–	–	–	–
28 May 1971	–	–	–	–	–	–	–	–
27 Aug 1971	.0775	.0732	.0764	.0793	.0562	.0470	.0897	.0693
26 Nov 1971	.0662	.0586	.0640	.0699	.0421	.0360	.0651	.0727
25 Feb 1972	.0713	.0820	.0743	.0575	.0453	.0343	.0733	.0596
26 May 1972	.0953	.0524	.0827	.0810	.0566	.0471	.0930	.0730
25 Aug 1972	.0727	.0565	.0680	.0733	.0604	.0434	.0683	.0646
24 Nov 1972	.0758	.0610	.0712	.0721	.0533	.0392	.0766	.0713
23 Feb 1973	.0741	.0740	.0740	.0628	.0545	.0342	.0690	.0644
25 May 1973	.1268	.0938	.1155	.0831	.0573	.0456	.1161	.0681
31 Aug 1973	.0721	.0608	.0682	.0745	.0566	.0429	.0653	.0764
30 Nov 1973	.0723	.0447	.0639	.0646	.0508	.0341	.0559	.0760
22 Feb 1974	.0619	.0428	.0567	.0442	.0374	.0243	.0734	.0449
31 May 1974	.1278	.0497	.1048	.0871	.0556	.0446	.0125	.0781
30 Aug 1974	.0987	.0506	.0849	.0718	.0468	.0376	.0881	.0647
29 Nov 1974	.0419	.0539	.0450	.0599	.0435	.0309	.0891	.0659
28 Feb 1975	.0122	.0274	.0158	.0486	.0440	.0271	.0625	.0647
30 May 1975	.0375	.0267	.0348	.0715	.0502	.0409	.0733	.0815
29 Aug 1975	.0460	.0181	.0385	.0631	.0470	.0375	.0817	.0767
28 Nov 1975	.0622	.0387	.0552	.0559	.0573	.0358	.0744	.0768
27 Feb 1976	.0602	.0495	.0567	.0529	.0474	.0331	.0620	.0620
28 May 1976	.0522	.0563	.0535	.0612	.0600	.0384	.0840	.0716
27 Aug 1976	.0495	.0126	.0373	.0603	.0500	.0358	.0882	.0688
26 Nov 1976	.0496	.0354	.0447	.0598	.0506	.0345	.0806	.0741
25 Feb 1977	.0573	.0469	.0534	.0516	.0447	.0295	.0610	.0603
26 May 1977	.0762	.0711	.0743	.0604	.0581	.0355	.0724	.0659
26 Aug 1977	.0702	.0609	.0668	.0563	.0530	.0335	.0577	.0622
25 Nov 1977	.0680	.0712	.0692	.0606	.0489	.0342	.0830	.0815
24 Feb 1978	.0750	.0805	.0770	.0485	.0478	.0278	.0749	.0697
26 May 1978	.0970	.0831	.0918	.0654	.0541	.0362	.0734	.0723
25 Aug 1978	.0594	.0766	.0658	.0588	.0533	.0342	.0690	.0724
24 Nov 1978	.0649	.0897	.0735	.0627	.0545	.0336	.0789	.0818

III ECONOMETRIC ISSUES

The dependent variables to be used in our study are the probabilities, p_t^d , described above. By definition these are bounded $0 \leqslant p_t^d \leqslant 1$. In fact, most of the p_t^d vary within fairly narrow ranges. Thus, p_t^s for males, UB and UA combined, always lie between 0.28 and 0.57 over the eleven-year period we are concerned with. The dependent variable can, however, be converted to a variable z_t^d, where $z_t^d = \log [p_t^d / (1 - p_t^d)]$. This transformed variable has a much wider range than p, and if E(p) = .5, E(z) = 0. As p_t^d in no case

approaches unity or zero in our data, there is no problem in calculating this transformation, and we have applied unrestricted least squares to the p_t^d transformed in this manner as we do not have enough information on the other elements in the labour force status matrix to use a restricted estimator.

A difficulty arises due to the gaps in our time series because of four missing observations. With missing observations the usual Durbin-Watson (DW) statistic is inappropriate and various adjustments have been proposed to deal with the problem. The easiest of these to incorporate into existing autocorrelation testing procedures is Honohan and McCarthy's (1982) dummy variable procedure. This necessitates adding to the data set a dummy variable for each missing observation which takes the value unity on the date for which the observation is missing and zero on all other occasions. The ordinary Durbin-Watson tables can then be used to test for autocorrelation with sample size, n, including the missing observations and number of regressors, k, including the dummy variables. Since the introduction of four dummy variables into our data set increases the number of regressors beyond 6 we use Savin and White's (1977) expanded version of the Durbin-Watson tables.

IV FACTORS INFLUENCING UNEMPLOYMENT DURATION

Our approach consisted of testing the influence of several variables on p_t^d. One group of variables relates to the macro-economic situation and comprises changes in the numbers employed in Transportable Goods Industries, (DETGI), an index of vacancies in industry for males and females (VACM, VACF) and the inflow rate to the LR for males and females (INFUB M/F, INFUAM, INFUTM). We also explored the explanatory power of a variable derived from the Lucas-Rapping (1970) view of the labour market in which unemployment is reduced as a consequence of unanticipated (wage) inflation. We measured this as the ratio of current to a weighted average of past wages (W/WSTAR) following Björklund and Holmlund (1981).

A second group of variables measured the possible effect of UI on unemployment. These comprised the maximum number of days entitlement to unemployment benefit (DUB), measures of the ratio of UB or UA payments to average net industrial earnings for males and females (the replacement ratio – RRUB M/F, RRUAM, RRUBUAM), and measures of the real value of entitlements under UB and UA (RVUB M/F, RVUAM, RVUBUAM). We introduce this variable in the belief that excessive attention has been focused on the price effect of UI on labour market behaviour, leading to an over-concentration on the role of replacement ratio or benefit/income variables. Cubbin and Foley (1977) argue the importance of income effects as well,

but chose to measure these using a variable based on the real earnings of those who are employed. We feel it is more appropriate to try to capture the relevant income effects through variables that measure the living standards represented by UI payments.

In all cases where stable seasonality was present in the dependent variable (see Table 2) quarterly seasonal dummies were included in the equations.

A criticism that has been levelled at a number of aggregate studies of the effects of UI on unemployment is that the use of a variable measuring the entitlement of a representative worker may not reflect the amounts actually paid to the unemployed. We have tried to refine our measure of benefit income by relating it to the type of payment being received (UB, UA) and by taking a weighted average of the entitlements of receipients in different family circumstances (see Walsh, 1978). O'Mahony's (1983A) study, in this issue of the *Review*, of the actual amounts received by the unemployed shows that actual replacement ratios do not differ significantly from our measure.

Finally, although our main concern is with the duration of unemployment as reflected in the LR survival probabilities discussed above, we also present some results using the inflow rates to the LR (INF M/F) as dependent variable. These were defined as the numbers on the LR receiving UB and/or UA for less than one week divided by the insured labour force. Several studies of the effect of UI on registered unemployment have stressed that its main influence is through lengthening the average spell of unemployment rather than stimulating a higher inflow (Nickell, 1977) but we felt that both possible effects should be explored.

The data series used in our models are given in the Appendix.

V EMPIRICAL FINDINGS

Multiple regression analysis of the effect of the two sets of variables on the probability of remaining unemployed indicated that the unemployment insurance variables generally had less influence on the dependent variables than the variables relating to the macro-economic situation and that neither set has very high explanatory power. The unemployment inflow variable was insignificant in most of the regressions for males and females and the W/WSTAR variable never attained a t-ratio above unity. The poor performance of the W/WSTAR variable supports the view that surprises in the rate of wage-inflation have played little or no role in the time series fluctuations in the duration of Irish unemployment, a conclusion similar to that reached by Björklund and Holmlund on the basis of Swedish and US data. The employment and vacancy variables were usually significantly different from zero, except in the case of the regressions for females, had the right

signs generally, and had a similar influence on the dependent variables. The DUB variable generally showed a highly significant effect in the UB and UT regressions. This suggests that lengthening the period of entitlement over which UB may be drawn not only causes a rise in the probability of UB claimants remaining unemployed but also results in a net increase in unemployment, the effect on UB not being fully offset by an effect in the opposite direction on UA. The DUB variable was tried in the UA regressions to see if it caused a switch in claimants' LR status. While it generally had the expected negative sign its coefficient was usually not significantly different from zero. The performance of the RR variable was generally very weak with negative, instead of the expected positive, signs predominating and the level of statistical significance being low. The RV variables, on the other hand, generally showed significant coefficients which were always positive in the regressions for males but not for females.

Table 4 summarises the results obtained when the significant variables relating to the macro-economy and the unemployment insurance scheme are included in the same regression equations.[3] It will be seen from the table that the survival probabilities are, in general, responsive to changes in industrial employment, falling during periods of rising employment, and that the extension of eligibility to UB to 12 months in 1968 and to 15 months in 1976 seems to have induced longer spells of both UB and total unemployment.

The evaluation of the effect of the two central UI variables, the replacement ratio (RR) and the real value of the transfer payments (RV), is complicated by the generally very high correlation between these pairs of variables (for example, the correlation between RRUBM and RVUBM is 0.99). This reflects the fact that most of the variance in the RR series is accounted for by abrupt changes in the numerator (e.g., the introduction of pay-related benefits in 1974) which is also the numerator of the RV series. We have, therefore, explored the performance of the equations in Table 4 with either RR or RV on their own. The results are shown in Table 5. There is very little basis for choosing between the pair of equations in this table. In terms of $\bar{R}^2$ or the Durbin-Watson statistic, RR and RV on their own perform about equally, although the t-ratios for the RV variables tend to exceed those for RR.[4] The negative, and generally insignificant coefficients recorded for RR in Table 4 are not found in Table 5, except for the puzzling significant negative coefficient for both RR and RV for UBLONGM.

3. The vacancy variable is not included because the series did not start until 1969.

4. Since most of the DW-values fall in the inconclusive region or indicate positive first order autocorrelation the regressions in the top panel of Table 5 were re-estimated using GLS. Apart from leading to slight reductions in some of the $\bar{R}^2$ and t-statistics, this did not give significantly different estimates of the regression coefficients shown in Table 5.

Table 4: *Regression results for probability of remaining on Live Register: UI and labour market variables, 1967:3-1978:4*

Independent variables	*Dependent variables*															
	Males												*Females*			
	Very short			*Short*			*Medium*			*Long*			*Very short*	*Short*	*Medium*	*Long*
	UB	*UA*	*UT*	*UB*	*UA*	*UT*	*UB*	*UA*	*UT*	*UB*	*UA*	*UT*	*UB*	*UB*	*UB*	*UB*
	1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*	*13*	*14*	*15*	*16*
DETGI	-0.12	-0.07	-0.11	-0.02	-0.03	-0.02	-0.13	-0.07	-0.07	-0.10	-0.08	-0.06	-0.02	-0.004	-0.07	-0.07
	(4.2)	(2.5)	(3.9)	(1.7)	(3.2)	(2.1)	(3.8)	(4.1)	(3.4)	(4.8)	(4.9)	(3.8)	(0.6)	(0.3)	(3.0)	(3.4)
RR UB/UA M/F	0.02	0.08	0.03	-0.02	-0.04	-0.02	-0.08	-0.10	-0.09	-0.03	-0.11	-0.05	0.01	0.03	-0.004	-0.003
	(0.7)	(1.3)	(0.9)	(1.9)	(2.1)	(2.2)	(2.9)	(2.8)	(3.7)	(1.6)	(3.1)	(2.8)	(0.4)	(1.9)	(0.2)	(0.1)
RV UB/UA M/F	-0.06	-0.07	-0.08	0.11	0.23	0.15	0.29	0.39	0.34	0.07	0.43	0.21	-0.07	-0.17	-0.03	-0.02
	(0.6)	(0.5)	(0.7)	(2.7)	(4.6)	(3.6)	(2.4)	(4.8)	(3.6)	(0.9)	(5.2)	(3.0)	(0.4)	(2.0)	(0.2)	(0.2)
DUB	0.004		0.002	0.002		0.001	0.009		0.003	0.009		0.002	0.002	0.001	0.009	0.009
	(2.6)		(1.8)	(3.3)		(2.8)	(5.2)		(2.7)	(7.9)		(2.6)	(1.0)	(1.2)	(6.2)	(7.5)
S1	-0.03		-0.03	0.31	0.15	0.25	0.11	0.05	0.13	0.14	0.27	0.21	-0.03	0.33	0.15	0.32
	(0.2)		(0.2)	(5.0)	(2.4)	(5.1)	(0.7)	(0.5)	(1.1)	(1.3)	(2.7)	(2.5)	(0.2)	(4.2)	(1.1)	(3.0)
S2	-0.13		-0.09	-0.24	-0.06	-0.20	-0.08	-0.16	-0.21	-0.02	0.02	-0.09	-0.36	0.007	0.009	0.09
	(0.8)		(0.6)	(3.6)	(0.8)	(3.8)	(0.4)	(1.5)	(1.7)	(0.2)	(0.2)	(1.1)	(2.3)	(0.1)	(0.1)	(0.8)
S3	-0.13		-0.71	-0.13	-0.81	-0.12	-0.33	-0.34	-0.31	-0.34	-0.25	-0.29	-0.04	0.15	-0.17	-0.15
	(1.0)		(0.6)	(2.3)	(1.4)	(2.7)	(2.2)	(3.6)	(3.1)	(3.5)	(2.6)	(3.8)	(0.3)	(2.1)	(1.3)	(1.5)
Intercept	-0.66	-0.86	-0.48	1.24	-0.06	-0.94	-1.99	1.44	-0.05	-1.88	2.36	0.54	-0.07	-1.49	-3.86	-3.33
	(1.5)	(0.7)	(1.1)	(6.8)	(0.2)	(5.8)	(4.0)	(2.3)	(0.1)	(5.9)	(3.6)	(2.0)	(0.1)	(4.9)	(7.4)	(7.9)
$\bar{R}^2$	.58	.36	.58	.84	.59	.85	.62	.70	.63	.76	.86	.82	.23	.57	.76	.80
F	6.74	4.68	6.76	23.02	7.51	24.79	7.69	11.66	7.93	13.98	29.64	19.19	2.21	6.48	14.31	17.32
DW	1.60	1.26	1.33	2.05	1.36	2.03	1.01	1.74	1.22	1.73	1.87	1.90	1.59	1.63	0.82	1.31

Note: t-ratios in parentheses.

Table 5: *Regression results for probability of remaining on Live Register: comparison of RR and RV unemployment insurance variables, 1967:3-1978:4 (intercept and seasonals' coefficients not reported)*

Independent Variables	*Dependent variables*															
	Males												*Females*			
	Very short			*Short*			*Medium*			*Long*			*Very short*	*Short*	*Medium*	*Long*
	UB	*UA*	*UT*	*UB*	*UA*	*UT*	*UB*	*UA*	*UT*	*UB*	*UA*	*UT*	*UB*	*UB*	*UB*	*UB*
	1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*	*13*	*14*	*15*	*16*
DETGI	−0.13	−0.07	−0.11	−0.02	−0.03	−0.02	−0.12	−0.07	−0.07	−0.10	−0.08	−0.06	−0.02	−0.008	−0.07	−0.07
	(4.3)	(2.6)	(4.0)	(1.5)	(2.5)	(1.8)	(3.5)	(3.2)	(2.9)	(4.8)	(3.6)	(3.5)	(0.7)	(0.5)	(3.1)	(3.5)
RR UB/UA M/F	0.003	0.05	0.01	0.007	0.04	0.01	−0.02	0.04	−0.006	−0.01	0.05	0.001	0.00002	0.0003	−0.008	−0.006
	(0.6)	(1.2)	(1.1)	(2.9)	(2.7)	(3.1)	(2.4)	(1.8)	(0.7)	(3.4)	(1.9)	(0.1)	(0.1)	(0.1)	(1.0)	(1.0)
DUB	0.004		0.002	0.003		0.002	0.01		0.005	0.009		0.003	0.002	0.001	0.009	0.009
	(2.6)		(1.7)	(4.4)		(3.9)	(6.3)		(3.8)	(8.9)		(3.7)	(1.1)	(1.2)	(6.3)	(7.7)
$\bar{R}^2$	.59	.38	.59	.82	.36	.80	.57	.52	.50	.76	.77	.77	.25	.54	.77	.81
F	7.52	5.52	7.51	21.01	3.83	19.39	6.90	6.40	5.54	15.39	17.28	16.36	2.47	6.19	16.18	19.59
DW	1.60	1.21	1.31	1.80	0.90	1.59	0.88	1.07	0.88	1.70	1.16	1.51	1.56	1.58	0.83	1.34
DETGI	−0.13	−0.07	−0.11	0.02	−0.03	−0.02	−0.11	−0.06	−0.06	−0.09	−0.08	−0.05	−0.02	−0.01	−0.07	−0.07
	(4.4)	(2.7)	(4.2)	(1.3)	(2.9)	(1.6)	(3.1)	(3.5)	(2.3)	(4.5)	(4.0)	(3.1)	(0.8)	(0.8)	(3.1)	(3.5)
RV UB/UA M/F	0.01	0.09	0.03	0.04	0.14	0.06	−0.05	0.19	0.01	−0.05	0.22	0.02	0.008	−0.02	−0.05	−0.04
	(0.5)	(0.9)	(0.8)	(3.6)	(5.1)	(4.3)	(1.8)	(4.1)	(0.4)	(3.0)	(4.4)	(0.9)	(0.1)	(0.6)	(1.0)	(1.0)
DUB	0.004		0.002	0.002		0.002	0.01		0.004	0.009		0.003	0.002	0.002	0.009	0.009
	(2.5)		(1.7)	(3.7)		(3.0)	(5.6)		(2.8)	(8.3)		(2.8)	(1.2)	(1.8)	(6.5)	(7.9)
$\bar{R}^2$	.59	.35	.58	.83	.55	.84	.54	.65	.50	.75	.83	.78	.25	.54	.77	.81
F	7.47	5.08	7.34	23.28	7.23	24.08	6.24	10.09	5.46	14.47	25.84	16.91	2.47	6.28	16.19	19.59
DW	1.60	1.11	1.30	1.92	1.25	1.81	0.77	1.38	0.77	1.59	1.55	1.44	1.57	1.59	0.81	1.32

Note: t-ratios in parentheses.

The regressions in the top panel of Table 5 were estimated for the sub-periods 1967:3-1974:1 and 1974:2-1978:4 to see if there was any evidence of a change in the regression relationship before and after 1974 which might be accounted for by changes in the economy which are not reflected in our model of unemployment. The results of the F-test for stability of coefficients indicate, in the great majority of cases, that there is no evidence of a structural break after 1974.

On the basis of these results it is clear that the main impact of UI on the duration of unemployment that we have been able to identify is through the increase in 1968 of the maximum period for which UB may be claimed from 156 to 312 days. The further extension to 390 days in 1976 would have been proportionately less important. In addition to this there is reasonably strong evidence that either the replacement ratio, or the real value of the benefits, tended to raise the duration of unemployment among males over the first six months of an unemployment spell. The evidence for an effect on the duration of unemployment at longer duration is very weak.

Attempts to explain the inflow variables in terms of labour force and UI variables are shown in Table 6.[5] The results when adjusted for the presence of autocorrelation in the original estimates, reveal few significant influences other than a stable pattern of seasonality.

The low explanatory power of any of the economic variables in our study of both the duration of, and inflow to, unemployment suggests that fluctuations in unemployment may be to a very considerable extent affected by withdrawal from the labour force, particularly in the case of females, as well as movement to and from employment or that the LR data are influenced by extraneous factors which are not encompassed by our model. This is a concrete illustration of the limitations of a study that focuses exclusively on UU and contains no information on UE and UN.

Our finding that unemployment insurance variables exert some significant influence on the duration of unemployment is in keeping with virtually all the published research on this issue. Gustman (1980, p. 48) for example, has noted that "the positive relationship between weekly benefits and duration is the most reliable result we have on the impact of the UI system". There is, however, considerable disagreement about the importance of any such effects in terms of the recorded unemployment rate. We have, therefore, explored the implications of the estimates of the unemployment insurance parameters in the equations in Table 5 for the overall level of unemployment.

5. The inflows of males to UB or UA were also tried as dependent variables but they were less responsive than the total inflow to the explanatory variables.

Table 6: *GLS Regression results for rate of inflow to Live Register, 1967:3-1978:4*

Independent variables	*Dependent Variables*					
	Males (UT)			*Females (UB)*		
DETGI	-0.08	-0.09	-0.07	0.015	-0.00001	0.014
	(1.2)	(1.3)	(1.1)	(0.2)	(0.02)	(0.2)
RR UB/UA M/F	0.04		0.15	0.04		0.04
	(1.6)		(1.7)	(2.0)		(0.9)
RV UB/UA M/F		0.13	-0.43		0.29	0.015
		(1.1)	(1.3)		(2.0)	(0.05)
S1	-0.24	-0.22	-0.34	-0.23	-0.19	-0.23
	(1.0)	(0.9)	(1.3)	(1.2)	(0.9)	(1.1)
S2	-1.13	-1.09	-1.18	-0.72	-0.67	-0.72
	(3.8)	(3.7)	(3.8)	(2.8)	(2.6)	(2.8)
S3	-1.25	-1.24	-1.28	0.28	-0.28	-0.28
	(5.9)	(5.9)	(5.9)	(1.6)	(1.6)	(1.6)
Intercept	5.16	5.79	4.24	1.54	2.27	1.55
	(4.9)	(7.1)	(3.6)	(1.5)	(3.2)	(1.4)
$\bar{R}^2$	.84	.84	.84	.61	.60	.60
F	36.75	37.00	32.75	11.14	10.85	10.02
DW	1.91	1.96	1.83	1.98	2.00	1.98
ρ	.55	.58	.47	.69	.66	.68

Note: (i) All coefficients have been multiplied by 1,000.
(ii) t-ratios in parentheses.

VI IMPLICATIONS FOR THE LEVEL OF UNEMPLOYMENT

The findings reported in this study allow us to attempt to quantify the impact of various changes in UI on the level of registered unemployment. This can be done by simulating what the LR would have been on certain assumptions about the duration and level of benefits and comparing this hypothetical LR with that corresponding to the actual levels of the UI variables. The comparison should be made between "steady state" values of the actual and hypothetical LR. To calculate these we have resorted to a demographic projection technique (Keyfitz, 1968). This involves the calculation of future levels of the LR from an initial level, an assumed inflow, and a set of survival probabilities, according to the following procedure:

$$LR_{t+1} = P.LR_t + \text{Inflow}$$

where LR is an nx1 vector of the numbers unemployed classified into n

duration categories, and P is an n x n matrix of LR survival probabilities. The available LR data do not readily lend themselves to this type of calculation, and interpolations have had to be made in order to make any headway with this approach. Following the notation introduced earlier in this paper, the numbers on the LR in duration category d at time t are denoted s_t^d and the projection can be written:

$$LR_{t+1} = \begin{bmatrix} s_{t+1}^1 \\ s_{t+1}^2 \\ s_{t+1}^3 \end{bmatrix} = \begin{bmatrix} 0 & 0 & 0 \\ p_t^1 & 0 & 0 \\ 0 & p_t^2 & p_t^{3+} \end{bmatrix} \begin{bmatrix} s_t^1 \\ s_t^2 \\ s_t^3 \end{bmatrix} + \begin{bmatrix} \text{Inflow} \\ 0 \\ 0 \end{bmatrix}$$

where

$$p_t^1 = s_{t+1}^{13\text{-}27} \Big/ s_t^{0\text{-}13}$$

$$p_t^2 = s_{t+1}^{27\text{-}40} \Big/ s_t^{13\text{-}27}$$

$$p_t^{3+} = s_{t+1}^{40+} \Big/ s_t^{27+}$$

The time interval is 13 weeks, and the elements of the P matrix denote the transition probabilities between succeeding duration categories. Normally the only non-zero elements in such a matrix are those on the sub-main diagonal, but when, as in the present case, the final category is open-ended, it is possible to survive from one period to the next within this category and hence the last cell in the P matrix is also non-zero. Although only three transition probabilities are used in this projection, it is necessary to have data on four duration categories, namely, 0-13, 13-27, 27-40 and 40 and over. The available LR data do not provide a breakdown of the 27-53 weeks category but we have again utilised the assumption that the numbers in this interval are evenly distributed between the 27-40 and 40-53 weeks intervals.

Using this framework, we can simulate the steady state LR corresponding to a given inflow and alternative P matrices. The first P matrix uses the actual values of the p_t^d averaged for 1977, the alternative P matrix uses the values of p_t^d obtained from the regression equations in the top panel of Table 5 with the level of DUB set equal to 312 (except for females in the short-duration category) and RRUBUAM set equal to 32.3 per cent for males in the short-duration category. Thus, we are trying to answer the question "What would the steady state level of the LR be if the maximum entitlement to UB had remained at 312 days, and the benefit level for short-duration males had been held at 32.3 per cent of average earnings as it was in the early 1970s?"

Ignoring any possible effects on the inflow to the LR, we have concentrated on the impact of changes in the escape rate on the level of unemployment. In our regression analysis we studied the effect of UI variables on p^s

and p^m, which correspond to p^1 and p^2 in our projection matrix above. We did not study the transition probability corresponding to p^{3+} directly because this duration category is not available in the published data. In order to calculate a hypothetical probability for this duration, we have used the results for p^ℓ in Equation 12 of Table 5. This gave us a hypothetical value for p^ℓ, and we scaled the estimated value of p^{3+} downwards in proportion to the ratio of the actual and hypothetical values of p^ℓ. In order to test the evaluation for sensitivity to the level of p^d used, the Live Register was also simulated for values half way between the original and hypothetical levels.

The calculations were performed separately for males and females. The following values were used in the P matrices:

	Males			Females		
	p^1	p^2	p^{3+}	p^1	p^2	p^{3+}
Actual	.4846	.5827	.7993	.3994	.3298	.6546
Hypothetical A	.4088	.4913	.7450	.3994	.1922	.4254
B	.4467	.5370	.7721	.3994	.2610	.5400

Thus, the hypothetical A calculations involve reductions in the LR survival probabilities of 16, 16 and 7 per cent respectively for males and 0, 42 and 35 per cent for females. The B values are mid-way between the actual and the hypothetical A values. Applying these P matrices to an initial LR and an assumed steady inflow yielded projected levels of LR that began to converge to steady state levels fairly quickly. The quarter-to-quarter change in LR for males, for example, was less than 1 per cent after 8 iterations (i.e., two years) and less than 0.01 per cent after 24 iterations (i.e., 6 years) for the A simulation. The outcome is shown in Table 7.

The results of the simulations indicate that the steady state LR would have been significantly lower had the UI variables assumed the hypothetical

Table 7: *Comparison of steady state actual and hypothetical numbers on LR Males and Females, 1977 (000s)*

	Derived from:				
	Actual p^d	*Hypothetical* p^d		*Difference in LR*	
		A	*B*	*A*	*B*
Males	74.1	56.3	64.1	+17.8	+10.0
Females	15.0	12.9	13.7	+2.1	+1.3
Total	89.1	69.2	77.8	+19.9	11.3

values specified and that the relationship between increases in the transition probabilities and the steady state LR is non-linear; increasing p^ds by half the difference between actual and hypothetical A values increases the Live Register by more than half the difference between the actual and hypothetical numbers unemployed. The effect of lower escape rates from the LR is not only to increase the steady state level of unemployment but also to increase the duration of unemployment spells. Relatively minor decreases in escape rates have substantial effects on the size and structure of the stock of registered unemployment. Only 31 per cent, for example, of the hypothetical A Live Register are in the "40 weeks and over" duration category, compared with 44 per cent of the actual LR.

These findings must be treated with great caution, based as they are on the results of regression equations which are obviously not definitive and on approximations concerning the duration categories, but they illustrate the possibility that relatively small changes in the escape rate of unemployment due to changes in the unemployment insurance programme can have a major impact on the size and structure of the Live Register.

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APPENDIX

DERIVATION OF QUARTERLY BENEFIT/INCOME RATIOS, REAL VALUE OF UI PAYMENTS, AND INFORMATION ON OTHER EXPLANATORY VARIABLES

The method by which the benefit/income ratios are calculated is the same as that outlined by Walsh (1978) in an earlier paper. All that needs to be added is that the pay-related part of the benefit is calculated as 40 per cent of reckonable weekly earnings in the tax year preceding the benefit year to which the claim for flat-rate benefit relates. Reckonable weekly earnings are one-fiftieth of gross taxable earnings in the relevant income tax year. An average of earnings in each quarter of the particular tax year was used to derive gross income for the year. The calculations for a single male for the quarter ending March 1977 are as follows:

	£	£
Average weekly industrial earnings during the quarter		70.80
Annual earnings		3681.60
Personal allowance	620.00	
Taxable earnings	3061.60	
Tax payable		984.97
Social insurance contributions		135.20
Net annual income		2561.43
Net weekly income (NWI)		49.26
Flat-rate unemployment benefit	10.90	
Pay-related benefit	14.40	
Total unemployment benefit (UB)		25.30
UB ÷ NWI		51.36%
Unemployment assistance (UA)		8.90
UA ÷ NWI		18.07%
Pay-Related Benefit		
Average annual earnings, April 1975-April 1976		2965.04
Reckonable weekly earnings		59.30
Ceiling for reckonable weekly earnings		50.00
Pay-related benefit [(£50 - £14) X .4]		14.40

The benefit/income series have been derived with the pay-related component included and excluded to highlight the effect which pay-related benefit has on the relative income of those who qualify for it (see Figure A1). The weights which were used to derive the aggregate benefit/income series shown in Table A1 and Figure A1 are the same as those used by Walsh (1978) to derive the corresponding annual series.

The real values of UB, UA payments were derived by deflating the nominal values by the quarterly Consumer Price Index.

The inflows on to the Live Register in each quarter are the number of males or females in receipt of UB or UA who have been on the register for less than one week divided by the number of males and females in the insured non-agricultural labour force.

Table A1: *Unemployment compensation as a percentage of quarterly net earnings, 1967-1979*

Year	Quarter	Single man			Single woman		Married man with 4 children			Replacement ratio	
		UB		UA	UB		UB		UA	R	
		FR	PR		FR	PR	FR	PR		FR	PR
1967	March	20.2		17.1	36.0		42.9		36.5	28.8	
	June	20.2		17.1	36.0		42.9		36.5	28.8	
	September	20.2		16.9	35.9		43.0		36.0	28.6	
	December	20.2		17.2	36.0		42.7		36.9	28.8	
1968	March	20.2		17.5	36.2		42.4		37.8	29.1	
	June	20.2		17.5	36.3		42.1		38.7	29.2	
	September	20.2		18.1	36.5		41.8		39.7	29.6	
	December	20.1		18.2	37.1		41.9		39.6	29.6	
1969	March	20.0		18.4	37.7		41.9		39.4	29.7	
	June	19.9		18.5	38.3		42.0		39.3	29.8	
	September	19.8		18.7	38.8		42.0		39.1	29.8	
	December	19.4		18.3	38.4		41.0		38.1	29.2	
1970	March	22.4		18.4	43.7		46.0		38.2	31.4	
	June	21.0		17.2	41.9		42.8		35.5	29.4	
	September	20.1		19.3	39.1		40.8		38.3	29.7	
	December	23.4		18.7	46.6		44.6		36.9	31.5	
1971	March	23.2		18.5	44.9		44.1		36.5	31.1	
	June	22.0		17.6	44.0		42.2		34.9	29.8	
	September	21.5		18.9	42.3		41.5		36.8	30.1	
	December	23.2		18.5	46.6		43.7		36.3	31.2	
1972	March	22.6		18.1	43.6		42.8		35.5	30.2	
	June	21.5		17.2	41.2		40.0		33.3	28.5	
	September	20.7		18.2	40.6		38.8		39.0	29.5	
	December	22.5		17.6	44.9		46.1		38.0	31.4	
1973	March	22.0		17.3	42.0		45.3		37.4	30.7	
	June	20.3		15.9	39.8		42.4		35.0	28.5	
	September	23.4		19.1	45.1		52.0		44.7	34.5	
	December	22.7		18.5	43.5		51.0		43.7	33.6	
1974	March	22.5		18.4	48.9		50.3		43.3	33.9	
	June	20.2	43.5	16.5	38.2	43.1	45.8	65.5	39.4	30.0	39.0
	September	23.6	46.6	19.3	44.4	49.2	53.7	73.2	46.1	35.1	43.9
	December	22.6	44.6	18.5	42.6	47.3	51.5	70.2	44.2	33.6	42.1
1975	March	21.8	49.8	17.8	38.5	49.7	49.7	73.6	42.6	32.1	43.6
	June	24.1	49.6	19.7	44.1	54.6	53.6	74.9	45.8	35.2	45.6
	September	23.3	48.0	19.1	41.1	51.0	51.9	72.5	44.4	33.9	43.9
	December	23.4	47.0	19.2	41.6	51.1	52.4	72.0	44.7	34.1	43.7
1976	March	23.2	53.8	19.0	41.2	57.5	51.9	77.4	44.3	33.8	46.7
	June	24.8	54.5	20.2	44.5	60.6	55.2	79.7	47.0	36.0	48.6
	September	23.6	51.9	19.3	42.4	57.8	52.6	75.9	44.8	34.4	46.3
	December	22.0	48.3	17.9	39.8	54.1	49.3	71.3	42.0	32.1	43.3
1977	March	22.1	51.4	18.1	39.1	63.3	49.6	73.9	42.3	32.2	45.6
	June	23.2	50.0	19.0	41.1	63.4	53.2	76.1	45.5	34.3	46.7
	September	22.7	48.9	18.6	39.5	60.9	52.2	74.6	44.6	33.5	45.6
	December	23.0	48.4	18.9	39.6	60.1	53.3	75.1	45.4	34.0	45.7
1978	March	23.1	48.5	18.9	38.8	65.2	53.5	75.3	45.6	34.0	46.4
	June	23.2	46.4	19.0	39.2	63.5	52.2	71.6	44.6	33.7	44.9
	September	23.0	45.9	18.8	38.4	62.2	51.8	71.0	44.2	33.3	44.4
	December	22.3	44.7	18.3	37.2	60.3	50.6	69.4	43.2	32.5	43.3
1979	March	22.1	44.2	18.1	36.6	59.3	50.2	68.8	42.8	32.2	42.8
Weights		.20		.29	.12		.19		.20		

Sources: Quarterly Industrial Inquiries, *Irish Statistical Bulletin*, 1969-1979; *Report of the Department of Social Welfare*, 1967-1971, 1972-1975 and 1976-1978.

Notes: (i) The figures for September 1967 and 1968 are based on earnings in October 1967 and 1968 while those for December 1967, March, June and December 1968 and March and June 1969 are linear interpolations. The figures for March and June 1967 are averages of the figures for September and December 1967.

(ii) FR = flat-rate, PR = pay-related.

Table A2: *Nominal and real value of unemployment benefit and unemployment assistance payments, 1967:3-1978:4*

Year	Quarter	Nominal					Real					CPI Mid-November 1968=100
		Single man		Single woman	Married man with 4 children		Single man		Single woman	Married man with 4 children		
		UB	UA	UB	UB	UA	UB	UA	UB	UB	UA	
1967	September	2.62	2.20	2.62	6.72	5.62	2.78	2.34	2.78	7.13	5.97	94.2
	December	2.68i	2.29i	2.68i	6.84i	5.93i	2.83i	2.42i	2.83i	7.21i	6.26i	94.8
1968	March	2.74i	2.38i	2.74i	6.97i	6.24i	2.83i	2.46i	2.83i	7.20i	6.45i	96.8
	June	2.81i	2.48i	2.81i	7.09i	6.56i	2.86i	2.52i	2.86i	7.21i	6.67i	98.3
	September	2.87	2.57	2.87	7.22	6.87	2.91	2.61	2.91	7.33	6.97	98.5
	December	2.96i	2.69i	2.96i	7.53i	7.12i	2.96i	2.69i	2.96i	7.53i	7.12i	100.0
1969	March	3.06i	2.82i	3.06i	7.84i	7.37i	2.96i	2.73i	2.98i	7.59i	7.13i	103.3
	June	3.15i	2.94i	3.16i	8.16i	7.62i	3.00i	2.80i	3.01i	7.76i	7.25i	105.1
	September	3.25	3.07	3.25	8.47	7.87	3.04	2.87	3.04	7.93	7.37	106.8
	December	3.25	3.07	3.25	8.47	7.87	3.02	2.85	3.02	7.87	7.31	107.6
1970	March	3.75	3.07	3.75	9.48	7.87	3.43	2.81	3.43	8.67	7.19	109.4
	June	3.75	3.07	3.75	9.48	7.87	3.29	2.70	3.29	8.32	6.91	113.9
	September	3.75	3.60	3.75	9.48	8.90	3.24	3.11	3.24	8.19	7.69	115.8
	December	4.50	3.60	4.50	10.75	8.90	3.80	3.04	3.80	9.08	7.52	118.4
1971	March	5.40	3.00	4.50	10.75	8.90	3.74	2.99	3.74	8.94	7.40	120.3
	June	4.50	3.60	4.50	10.75	8.90	3.64	2.91	3.64	8.70	7.20	123.6
	September	4.50	3.95	4.50	10.75	9.55	3.57	3.13	3.57	8.53	7.58	126.0
	December	4.95	3.95	4.95	11.50	9.55	3.85	3.07	3.85	8.94	7.43	128.6
1972	March	4.95	3.95	4.95	11.50	9.55	3.76	3.00	3.76	8.74	7.26	131.5
	June	4.95	3.95	4.95	11.50	9.55	3.71	2.96	3.71	8.61	7.15	133.5
	September	4.95	4.35	4.95	11.50	11.55	3.61	3.17	3.61	8.38	8.42	137.2
	December	5.55	4.35	5.55	14.00	11.55	3.99	3.12	3.99	10.06	8.30	139.2
1973	March	5.55	4.35	5.55	14.00	11.55	3.84	3.01	3.84	9.68	7.98	144.7
	June	5.55	4.35	5.55	14.00	11.55	3.72	2.92	3.72	9.39	7.75	149.1
	September	6.55	5.35	6.55	17.50	15.05	4.29	3.51	4.29	11.47	9.86	152.6
	December	6.55	5.35	6.55	17.50	15.05	4.18	3.41	4.18	11.16	9.60	156.8
1974	March	6.55	5.35	6.55	17.50	15.05	3.99	3.26	3.99	10.66	9.17	164.2
	June	14.11	5.35	7.39	25.06	15.05	8.14	3.09	4.26	14.46	8.68	173.3
	September	15.31	6.35	8.59	28.36	17.85	8.51	3.53	4.77	15.76	9.92	179.9
	December	15.31	6.35	8.59	28.36	17.85	8.13	3.37	4.56	15.07	9.48	188.2
1975	March	17.74	6.35	10.01	30.79	17.85	8.73	3.12	4.92	15.15	8.78	203.3
	June	19.39	7.70	11.66	35.19	21.55	8.99	3.57	5.41	16.31	9.99	215.7
	September	19.39	7.70	11.60	35.19	21.55	9.06	3.60	5.45	16.44	10.07	214.0
	December	19.89	8.10	12.16	36.64	22.75	9.05	3.68	5.53	16.66	10.35	219.9
1976	March	22.97	8.10	13.84	39.72	22.75	9.73	3.43	5.86	16.83	9.64	236.0
	June	23.97	8.90	14.84	42.47	25.05	9.56	3.55	5.92	16.94	9.99	250.7
	September	23.97	8.90	14.84	42.47	25.05	9.42	3.50	5.83	16.69	9.85	254.4
	December	23.97	8.90	14.84	42.47	25.05	9.04	3.36	5.60	16.01	9.45	265.2
1977	March	25.30	8.90	17.65	43.80	25.05	9.19	3.23	6.41	15.91	9.10	275.3
	June	26.85	10.20	19.20	47.95	28.70	9.40	3.57	6.72	16.78	10.05	285.7
	September	26.85	10.20	19.20	47.95	28.70	9.30	3.53	6.65	16.61	9.94	288.7
	December	27.45	10.70	19.80	49.65	30.05	9.34	3.64	6.74	16.90	10.23	293.8
1978	March	27.45	10.70	21.95	49.65	30.05	9.21	3.59	7.37	16.66	10.08	298.0
	June	28.75	11.75	23.25	53.20	33.10	9.48	3.88	7.67	17.55	10.92	303.2
	September	28.75	11.75	23.25	53.20	33.10	9.20	3.76	7.44	17.02	10.59	312.5
	December	28.75	11.75	23.25	53.20	33.10	9.07	3.71	7.33	16.78	10.44	317.1
1979	March	28.75	11.75	23.25	53.20	33.10	8.70	3.56	7.04	16.11	10.02	330.3

Sources: As for Table A1.
i = linear interpolation.

Table A3: *Data on vacancies in manufacturing industry, changes in employment in Transportable Goods Industries, inflows on to the Live Register, and the duration of flat-rate unemployment benefit, 1967:3-1978:4*

Year and Quarter	*Proportion of firms reporting a shortage of labour*		*DETGI*	*Inflows on to the Live Register*				*Duration of flat-rate benefit*
				Males			*Females*	
	VACM	*VACF*		*UB*	*UA*	*UT*	*UB*	*DUB*
	(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(7)*	*(8)*
25 August 1967			1.2	.497	.175	.672	.336	156
24 November 1967			0.1	.510	.204	.714	.346	156
23 February 1968			−0.2	.491	.172	.663	.281	312
31 May 1968			5.1	.432	.130	.563	.313	312
30 August 1968			2.2	.397	.122	.519	.231	312
29 November 1968			2.1	.517	.167	.684	.304	312
28 February 1969			1.9	.553	.121	.674	.376	312
30 May 1969	9.60	10.56	4.6	.281	.111	.392	.159	312
29 August 1969	5.10	16.20	2.6	.264	.135	.399	.136	312
28 November 1969	6.58	7.99	1.0	.404	.133	.537	.248	312
27 February 1970	4.44	7.40	−4.2	.519	.145	.664	.203	312
May 1970	3.60	6.00	3.3	—	—	—	—	312
28 August 1970	4.81	8.88	3.0	—	—	—	—	312
27 November 1970	3.15	5.60	−0.9	.448	.157	.606	.318	312
February 1971	2.17	7.75	−2.7	—	—	—	—	312
28 May 1971	1.60	6.72	0.6	—	—	—	—	312
27 August 1971	1.52	9.88	−0.7	.354	.101	.455	.264	312
26 November 1971	0.30	3.30	−1.2	.522	.254	.777	.323	312
25 February 1972	1.68	4.80	−1.5	.480	.162	.642	.307	312
26 May 1972	1.86	4.96	3.6	.354	.134	.489	.239	312
25 August 1972	1.90	2.70	1.7	.376	.150	.525	.284	312
24 November 1972	1.95	5.25	0.6	.424	.188	.612	.253	312
23 February 1973	3.15	4.90	2.4	.420	.174	.595	.259	312
25 May 1973	4.73	3.01	4.7	.279	.149	.429	.212	312
31 August 1973	4.24	11.13	0.9	.271	.128	.399	.219	312
30 November 1973	2.90	7.54	2.2	.358	.124	.482	.231	312
22 February 1974	3.6	4.7	0.6	.385	.137	.522	.306	312
31 May 1974	5.6	5.7	1.9	.445	.123	.568	.245	312
30 August 1974	3.8	3.5	−1.8	.379	.155	.534	.428	312
29 November 1974	1.5	0.8	−2.5	.516	.171	.688	.547	312
28 February 1975	0.1	1.0	−6.6	.526	.169	.694	.500	312
30 May 1975	0.1	1.5	−3.5	.516	.155	.672	.440	312
29 August 1975	0.1	0.7	−3.2	.539	.197	.736	.478	312
28 November 1975	0.1	1.0	0.0	.666	.268	.934	.425	312
27 February 1976	0.1	0.6	−2.7	.478	.259	.736	.426	312
28 May 1976	0.2	0.4	3.7	.411	.162	.573	.460	390
27 August 1976	0.2	0.7	2.0	.389	.184	.573	.500	390
26 November 1976	0.2	0.8	2.3	.414	.218	.631	.419	390
25 February 1977	0.3	0.6	0.2	.431	.256	.688	.400	390
27 May 1977	0.6	0.7	3.0	.390	.218	.608	.327	390
26 August 1977	0.2	0.5	1.3	.374	.213	.587	.453	390
25 November 1977	0.9	0.4	0.2	.415	.267	.683	.464	390
24 February 1978	1.1	0.3	0.1	.449	.237	.686	.351	390
26 May 1978	1.3	0.9	4.1	.313	.198	.511	.354	390
25 August 1978	2.3	1.3	1.7	.340	.216	.557	.349	390
24 November 1978	5.0	0.6	2.0	.381	.202	.582	.396	390

Source: (1) and (2): Walsh (1977, Table 1) and own calculations; (3) *Irish Statistical Bulletin*, 1969-1979; (4)-(7) Quarterly Survey of Registration on Live Register and own calculations; (8) *Report of Department of Social Welfare*, 1967-1971, 1972-1975 and 1976-1978.
Note: The figures for inflows on to the Live Register have been multiplied by 100.

Figure A1: *Weighted average flat rate and pay-related replacement ratios, quarterly 1967-79*